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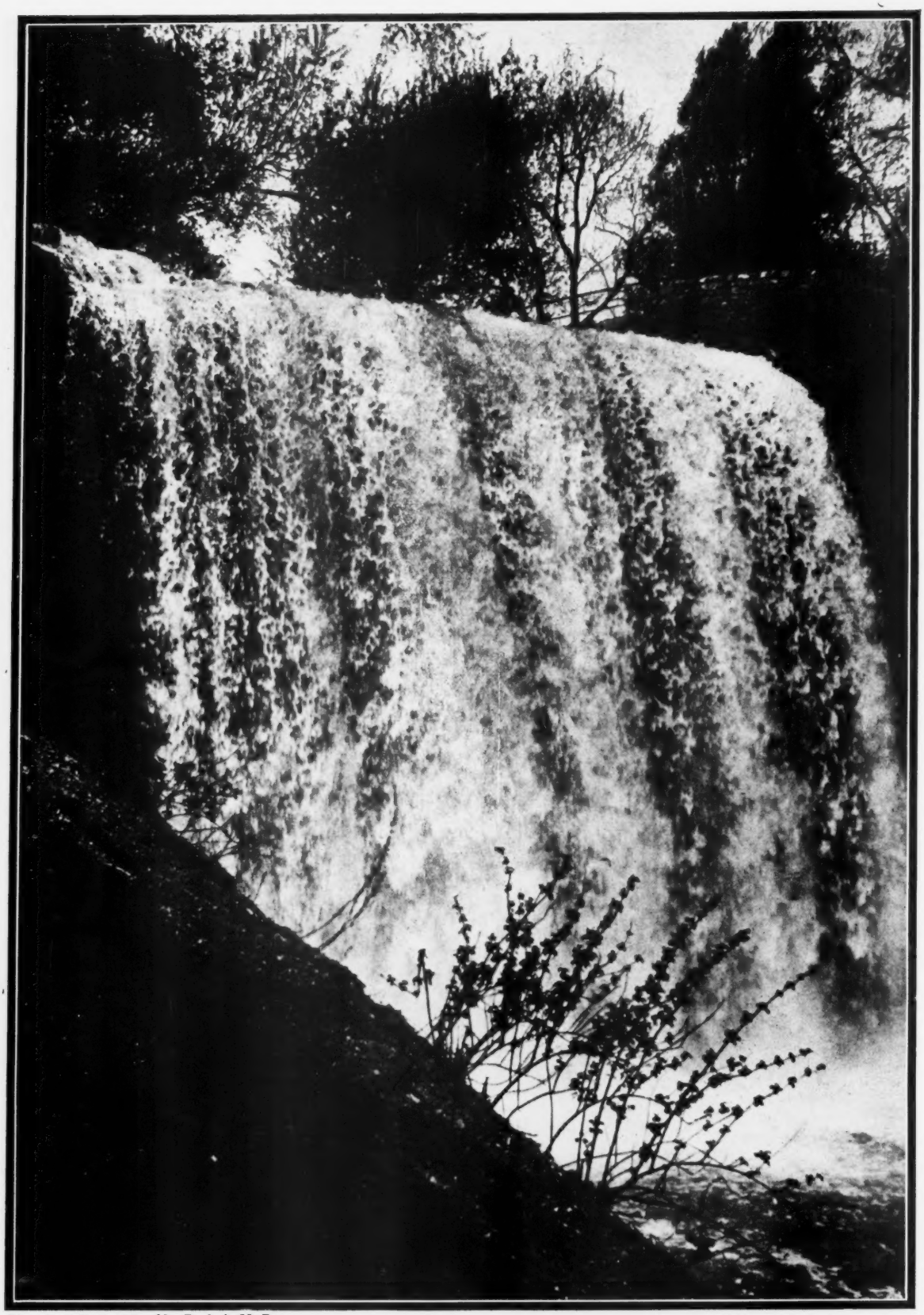

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MINNEHAHA FALLS, MINNEAPOLIS, MINNESOTA

AMERICAN FORESTRY

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EDITORIAL

A DECADE OF PROGRESS IN THE FOREST SERVICE

THE retirement of Colonel Henry S. Graves as head of the Forest Service is a fitting occasion to review the progress which has been made during the ten years in which he has so admirably directed the forest activities of the National Government. It is a decade during which the Forest Service has settled into its stride. Prior to 1910, its efforts of necessity were concentrated largely upon the creation of the National Forests as a first step in conservation, upon building a secure foundation under them in public support, and upon blocking out the main lines for their development toward the maximum national service. Colonel Graves' administration, in its development of business methods, enlarged usefulness, and the application of technical forestry to management problems, may be summed up as a transformation of forest reserves into permanent National Forests.

During this period the gigantic task of classifying the lands embraced in the National Forests has been nearly completed. Large areas of agricultural land have been segregated and opened to settlement, insuring the permanent use of the remaining land for forest production as a public enterprise. A comprehensive policy for developing the National Forests by road building has been entered upon and carried forward, with the recognition and support of Congress through appropriations totaling $19,000,000. The last ten years have brought several seasons of exceptional and extreme fire hazard and have given the Forest Service a task in organized fire protection not paralleled in the history of the world. The emphasis given to the development of fire protection organization and methods and the unremitting study devoted to every phase of this great problem represent today one of the greatest assets not only of the Forest Service, but of the United States, with the increasing recognition of the vital importance of stopping forest losses from fire.

The use of the National Forests by the public has been vastly increased. The number of timber sales has much more than doubled and now exceeds 12,500 sales annually. The yearly cut of timber has nearly doubled. There has been a material increase in the use of the forage on the National Forests, a use now shared by nearly 40,000 farmers and stock-growers. The annual receipts from the National Forests have more than doubled and are now close to four and one-quarter million dollars. Not alone, however, in their economic phases has the value of the National Forests as a public enterprise been demonstarted. The thousands of summer homes and camps now occupied and enjoyed every year and the hundreds of thousands of campers and visitors who flock to the National Forests testify to the enormous public value of these national holdings as a source of health and recreation to the people.

One of the most significant and forward-looking steps which has been taken and for which the American Forestry Association may fairly claim a measure of credit is the enactment of the Weeks Act, under which it has been possible to extend the National Forests into the Eastern States and make a large advance in the protection of the watersheds of important navigable streams. The purchase of nearly two million acres of mountain forests has been completed by the National Forest Reservation Commission and these areas are today under administration as National Forests, with all their varied forms of public service. Under the same law a definite policy has been inaugurated of Federal co-operation with the States in the protection of forested watersheds from fire which

COLONEL GRAVES RESIGNS

On March 8 announcement was made that, after ten years of service as Chief Forester of the United States Department of Agriculture, Colonel Henry S. Graves had notified the Secretary of Agriculture that he intends to ask to be relieved of his position. He expects to leave the service about May 1.

"Since the pecuniary returns afforded professional and scientific men in the Government service inadequately provide against the exhaustion of the working powers which must inevitably take place in time, and entail sacrifices from which employment elsewhere is free," Colonel Graves wrote, "the only course consistent alike with self-respect and a regard for the public interests seems to me to be retirement from office before efficiency has been impaired. Present conditions, which amount to a heavy reduction in the rate of compensation in practically every branch of the Government service, emphasizes this point of view."

Resignation of Albert F. Potter as Associate Chief of the Forest Service was also announced. Mr. Potter, in asking that his resignation be made effective on April 15, says he feels that "the time has now arrived when I should retire from the Government service and give my attention to private interests."

has had a far-reaching influence in stimulating forest protection in almost every section of the United States and which, under its logical and necessary development, should go a long way toward the solution of our national forestry problems.

The past decade has also witnessed significant advances in forest research. One of the first acts of Colonel Graves upon assuming his duties was to formally open the Forest Products Laboratory, at Madison, Wisconsin. In ten years' time the usefulness of this institution in almost every phase of the utilization of forest products has been completely demonstrated. Research in silviculture and technical forest practice has kept pace. A series of forest experiment stations located in several important forest regions of the West are steadily building up the science of American silviculture. The technical study of forage resources in the National Forests, which was begun in 1907, has been carried forward on an extended scale. This study is not only furnishing the data necessary for the most effective use of the stock ranges in the National Forests, but is furnishing the information on which the whole livestock industry of the Western States can utilize their grazing lands in a farsighted way which will make them increasingly productive. It is doing for the forage resources of the West essentially what other branches of the Service are doing for its timber resources. During the severe depression and uncertainty prevailing in the lumber industry for a period of several years, the Forest Service took off its coat and made a thorough study of the whole situation, by means of which it was possible for the first time to present to the country in a comprehensive way the fundamental facts in our forest economics which underlie many pending problems. During the past year, Colonel Graves himself has put before the country a clear statement of what these problems are and has inaugurated a new movement for national action to put a stop to forest devastation.

The war brought many acute problems to the Forest Service. A large number of men enlisted for forestry operations in France, whose preliminary organization was carried out by Colonel Graves in person. At the same time it was possible to maintain the essential administrative activities on the National Forests unimpaired and to aid the Government in many vital problems related to war supplies of forest products.

In the past decade, much of the old opposition to the National Forests has disappeared with the steadily increasing recognition of their local and national usefulness and of the soundness of their principles of administration. Nevertheless, the Forest Service has been confronted with many difficulties. It has been unable to extend its work along many needed lines, notwithstanding their obvious public benefit. Colonel Graves has had a hard fight to maintain the spirit and effectivness of his organization in the face of these difficulties. The standing of the Forest Service today and the recognition of the value of its many lines of work are sufficient proof that he has succeeded. But it rests upon all of us who believe in forests as a vital thing in our national life and economy to see to it that the work of the organization which he has so ably led goes on with the public support which it merits.

BACK UP OUR PUBLIC SERVICE

THE resignation of the Chief of the Forest Service may well make all good citizens pause to consider whither we are driving in respect to our public service. Colonel Graves is not dropping the work which he has directed so ably for the past ten years to accept a more remunerative position. It is evident that the principal reason for his action is to protest against the difficulties and handicaps placed upon the maintenance of an efficient public service by the Government itself.

The Forest Service is simply a striking illustration of the general condition. It was created not many years ago, imbued with the high ideals of public service inspired by President Roosevelt and Gifford Pinchot. It has always carried before it a high standard of efficiency and the vision of a constantly widening field of usefulness; and it has sought to make them real and vital things in the daily work of its members down to the summer guard on his lookout peak. It has accomplished a prodigious task and met many crises successfully because of the conception of public service which drove it forward. But to maintain its efficiency as a business organization and its driving power has steadily become more difficult because of the failure of the Government to recognize the importance and responsibility of its work and to provide adequately for its needs. No machine can run indefinitely on its initial momentum; and human machines demand, above all things, encouragement and recognition. The Forest Service is a human machine, whose needs and interests Colonel Graves has carried close to his heart. Because he has been unable adequately to provide for these needs, because he sees clearly that the efficiency of his organization and its capacity for public service are at stake, he has taken the only means open to him to protest against the Governmental indifference which is responsible.

A few facts show how serious has become the problem of "turn-over" in personnel in the Forest Service. During the fourteen months prior to last September this organization lost 28 per cent of its men, including 18 forest supervisors and 214 forest rangers. Out of six logging engineers, four resigned for outside employment. In the vast majority of these cases the sole reason was economic necessity. Many of these men have obtained in outside employment two or three times the remuneration received for Government work. The process is still going on, with additional men quitting every month. Since December 1, six officers occupying responsible positions have resigned in a single district. A large

number of men have held on solely through loyalty to the organization and faith that their situation would be remedied.

No organization, particularly one whose work requires such a degree of expertness, can continue long on this road without a crippling of its efficiency. Aside from the actual losses in personnel, effective service cannot be rendered by men who are unsettled in mind, who are finding increasing difficulty in making ends meet, and who are constantly facing the necessity of dropping their chosen work in order to provide adequately for their families. And the same reasons which are compelling men to leave prevent recruiting the Service with new employes of adequate qualifications.

The legislator in Congress may not see the connection between the resignation of an experienced forest supervisor or forest ranger and an emergency expenditure of thousands of dollars to stop a disastrous forest fire. But the connection is there. The loss of experienced men cannot but have a vital bearing upon the efficiency of the whole organization, not only in stopping fires but in all activities, not the least of which is giving good service to the users of the National Forests. Furthermore, efficiency and morale go together. Cripple the first and a break in the second is sure to follow.

No one has realized this situation better than Colonel Graves. He has been combatting it with every means at his command. He has gotten the first-hand story of scores of his own forest officers in the field; and he tells us that he marvels that the Forest Service has hung together as long as it has. The very modest relief granted by the appropriation committees in Congress this winter is very far from adequate. Colonel Graves has gone as far as he can, and he now in effect puts the question up to the American public.

The situation of the Forest Service, let it be repeated, is but typical of our entire technical public service. The question is up to the people of the United States. Following the war, with the increase in Government activities growing out of it, the efficiency and ideals of our public service are of more vital concern to the United States than ever before. Work cannot be well done unless it is well remunerated. Particularly, specialized and technical work cannot be well done unless the men and women doing it are encouraged by the conditions of their employment and the opportunities for advancement to put their very best into it. The right attitude of the people and Government of the United States toward their public services is one of the most urgent questions before us today.

COLONEL W. B. GREELEY THE NEW FORESTER

Colonel W. B. Greeley was on March 14 appointed Chief Forester of the United States to succeed Colonel Henry S. Graves, and Secretary Meredith's selection will be heartily approved by foresters throughout the country. Colonel Greeley has long been classed as one of the most able men in the Forest Service. Not only is he a thoroughly trained forester, but he has unusual administrative ability, an asset which, combined with his faculty for getting practical results, is certain to make his administration successful.

Colonel Greeley is from California, a graduate of the University of California and the Yale Forest School, and has been in the Forest Service continuously since 1904, except for two years of military service with the American Expeditionary Forces. In the Forest Service he has had long and varied administrative experience. He has been advanced through all the technical grades from the lowest to his present position as Assistant Forester. His first assignment was in the Southern Appalachians. From 1906 to 1908 he was Supervisor of the Sequoia National Forest in California. After a short period of service in the Washington office he was appointed District Forester in charge of the National Forests of Montana and Northern Idaho, with headquarters at Missoula, Montana. In this position it fell to him to protect these forests, having a total area of over 29,000,000 acres at the time of the great fires in 1910. The following year he was appointed Assistant Forester and placed in charge of the Branch of Silviculture, now the Branch of Forest Management, in the Washington office. This branch has supervision of all National Forest timber sales and timber cutting, together with other important lines of work.

With the opening of the war it was decided to raise and send to France forestry troops, and their recruiting was assigned to Colonel Greeley. To prepare the way for their operations in the French forests, the Chief Forester, Colonel Graves, was sent to France and attached to the Central Staff. One of his first steps was to send for Colonel Greeley to aid in the work. After Colonel Graves returned to the United States Colonel Greeley took his place and finally became chief of the Forestry Section in the American Expeditionary Forces, in charge of 21,000 forestry troops and 95 sawmills, with lumbering operations scattered from the zone of military operations to the Pyrenees and from the Swiss border to the Atlantic. He was awarded a decoration by the French, in recognition of his war service, as a Chevalier of the Legion of Honor, and by the English as member of the Distinguished Order of Great Britain. Last July, after nearly two years of foreign service, he was brought back to the United States, and in October resumed his old position in the Forest Service, but retaining a commission as Lieutenant Colonel in the Engineer Officers' Reserve Corps. He is a fellow of the Society of American Foresters, a director of the American Forestry Association, and an author of various publications and papers on forestry subjects. His high professional standing, broad training and experience and demonstrated capacity as an executive cause him to be regarded as undoubtedly the best man in the country for the position of Chief Forester.

"I consider," said Secretary Meredith in announcing his selection, "that the department is fortunate in having available a man so well qualified to fill an exceptionally difficult and responsible position, and I am convinced that the public interests in forestry will be in good hands with Colonel Greely at the head of our Forest Service."

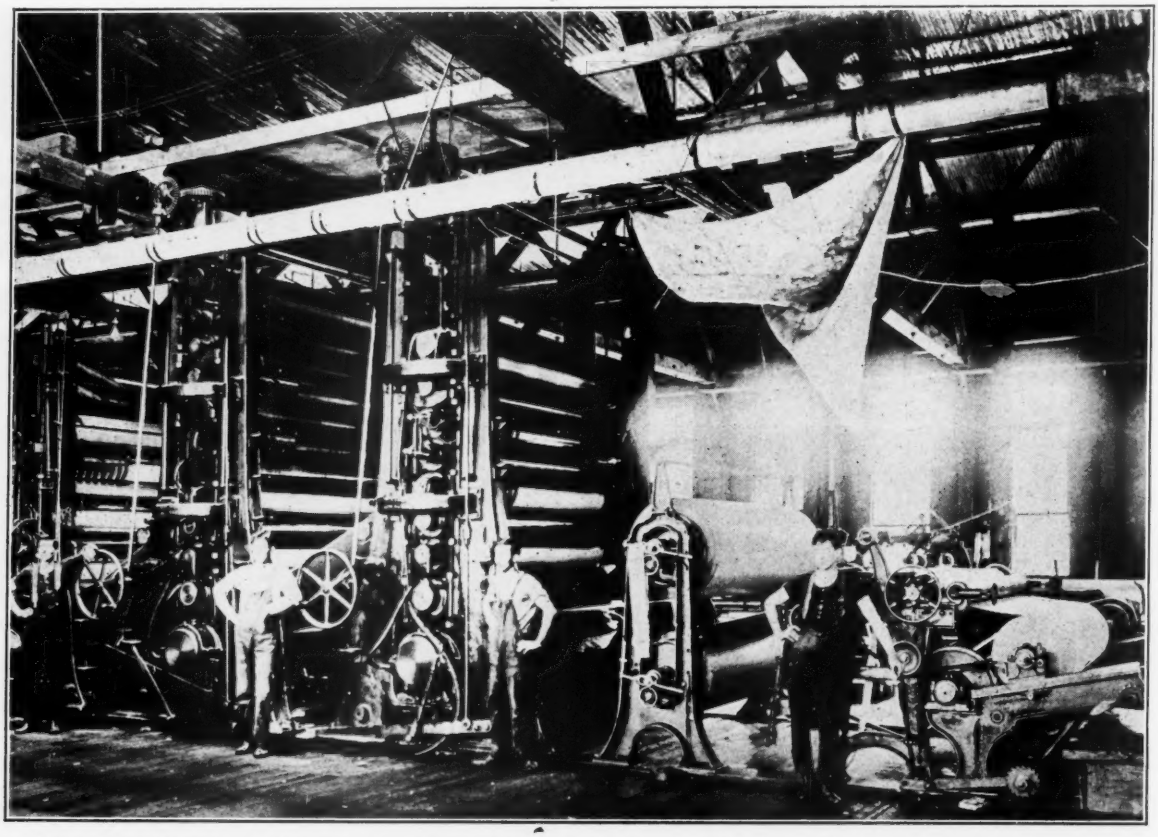
RAW MATERIAL FOR THE PAPER INDUSTRY

BY A. F. HAWES, FOREST SERVICE

DURING the war period the forests were levied upon for numerous products, such as lumber and timbers for cantonments and ships, wood for use in airplanes and rifle stocks, and material for the manufacture of distillates and tanning extracts. In this way the forests of the United States were of material assistance in the winning of the war which was fought by the Allies in the name of democracy. The forests have an equally important part in the peaceful work of making democracy safe for the world, for the ultimate solution of all our problems must come through education, and the printed page is one of the most powerful educational agencies.

The present paper shortage is probably the result of the unusual amount of advertising carried by the newspapers rather than of any scarcity of wood, but it has impressed upon the country the importance of maintaining an adequate supply of paper, and this, in the last resort, means providing a permanent supply of wood. Substitutes are being found for lumber and, consequently, the per capita consumption of it has somewhat declined, but wood is still the cheapest of all paper-making materials. The per capita production of paper in the United States has increased since 1880 from 18 to 118 pounds, and by far the largest proportion of paper is made from wood. The better grades of paper are still made from rags, as they were before wood was used for the manufacture of paper. While paper can be made from various plant fibers, straws and certain other substances, still the collection of these materials in bulk is so costly that none of them can compete with wood, and there seems to be no prospect of anything taking the place of wood for the production of newsprint and the other cheaper grades of paper. Of the 6,000,000 tons of paper made in the United States in 1916, three-sevenths was used for printing, one-fourth for boxing, one-seventh for wrapping, one-eighth for writing and typewriting, and the remainder for miscellaneous uses, including building and wall papers.

There are four processes of making wood pulp—the mechanical process, by which wood is ground under great pressure by grindstones, and three chemical processes known as the sulphite, soda and sulphate methods. By the chemical processes wood chips are cooked in a liquor in immense digesters for a period of several hours. By the mechanical process the wood



THE SUPERCALENDER, SLITTING AND REWINDING PART OF A PAPER-MAKING MACHINE. THE PAPER PASSES THROUGH FROM THE LEFT

fibers are torn and broken, and, therefore, a paper made wholly from ground pulp would lack strength. By the chemical processes the entire fibers are separated by the dissolving of the connecting lignin. For this reason chemical pulp is added to ground pulp to give strength to the paper. As the expense of making chemical pulp is about twice that of making ground pulp, the smallest possible amount is employed for the cheaper kinds of paper such as those used for newspapers and catalogues. This difference in cost is due partly to the fact that it requires about two cords of peeled wood to produce one ton of chemical pulp, as against one cord to make one ton of ground pulp, and partly to the fact that the cost of chemicals used in those processes is considerable and the plant involved is more expensive. In some newsprint papers as much as 85 per cent of ground pulp is used. The chief essentials for the location and operation of a ground-pulp mill are a plentiful supply of wood and good water power. For a sulphite mill, wood, sulphur, lime or limestone, and coal are required. Most of the sulphur, however, used even in the Northern mills, comes from Louisiana.

A PILE OF SPRUCE AND FIR LOGS TO BE MADE INTO NEWSPRINT PAPER

Newsprint paper must be cheap, reasonably strong and light-colored; and, as the sulphite process is the only one of the chemical processes which produces a light-colored paper, newsprint is made entirely from ground and sulphite pulp. Papers made by other methods could, of course, be bleached, but the expense of this process would make it impracticable. Under methods so far developed the resinous woods, such as the Southern pines, cannot be used by the ground or sulphite methods, and the short-fibered woods, such as poplar, are not strong enough for newsprint. This class of paper is, therefore, made entirely from such non-resinous woods as the spruces, firs and hemlocks. On a basis of 80 per cent of ground pulp, it requires about 1.5 cords of wood to produce one ton of newsprint paper, and the cost of the wood amounts to from 30 to 40 per cent of the cost of the paper.

The soda and sulphate processes produce a dark-colored paper. The latter is a comparatively new process and may eventually take the place of the former, since it produces a stronger paper known as "kraft." From such long-fibered wood as that of the Southern pines a very strong paper is produced, which is used largely for wrapping purposes. The soda pulp is too soft for the manufacture of wrapping paper. This process employs chiefly such woods as poplar, basswood, gum, beech, birch, maple and chestnut. When the soda pulp is bleached, as nearly all of it is, it is used in making paper for books and magazines.

From the above it will be seen that most of our woods may be used for paper making by one process or another, but some are much better suited than others by reason of their long fibers, their freedom from resin, or their occurrence in large quantities. In 1918 the production of wood pulp in the United States was 3,313,861 tons, a decrease of 6 per cent from 1917. Of this amount 41 per cent was mechanical pulp, 44 per cent sulphite, 11 per cent soda and 4 per cent sulphate. The consumption of cordwood by 250 establishments was 5,250,794 cords, of which about 744,518 cords were imported. These startling figures naturally suggest the inquiry whether our forests can continue to furnish such a vast amount of wood indefinitely. The following table shows the amount of pulpwood consumed in the United States in 1918:

Table I.—Pulpwood consumption, 1918. Quantity of wood consumed, by kinds, with percentages of distribution.*

Kind of Wood.	Quantity, Cords.	Distribution, Per Cent.
Spruce—Domestic	2,204,143	42.0
Imported	666,164	12.7
Hemlock	836,406	15.9
Balsam fir	368,117	7.0
Poplar—Domestic	210,849	4.0
Imported	78,354	1.5
Jack pine	152,124	2.9
Yellow pine	133,774	2.5
Yellow poplar	61,247	1.2
Tamarack	52,031	1.0
Gum	47,145	.9
White fir	35,119	.7
Cottonwood	18,685	.4
Basswood	12,110	.2
White pine	10,183	.2
Beech, birch, maple and chestnut	202,930	3.9
All other species	6,810	.1
Slabs and other mill waste	154,603	2.9
Total	5,250,794	100.0

* Pulpwood Consumption and Wood Pulp Production, 1918," by Franklin H. Smith, Forest Service, United States Department of Agriculture, in co-operation with the Newsprint Service Bureau.

From the above table it will be seen that spruce, hemlock, fir and poplar are the only varieties of which appreciable quantities are used. If white fir and cottonwood are included, these varieties comprise nearly 85 per cent of the wood used for pulp. So far as the yellow pines and hardwoods are concerned, all of which are used in small amounts, we may assume that the supply is ample unless the demand for them is very much increased. There are no accurate estimates of the stands of any of the varieties of trees, but the opinions of many foresters and other authorities have been collected and carefully weighed. From the best information obtainable in this way it is estimated that there are about 25,000,000 cords of poplar in the strip of States from Maine to Minnesota, inclusive. At the present rate of consumption, therefore, there is no danger of a shortage of this species, since it grows rapidly and is probably increasing faster than it is being cut.

The most serious problem is connected with our supplies of newsprint woods—spruce, hemlock and fir. The consumption of these woods by regions is shown in Table II:

Table II.—Native pulpwood consumption. Quantity of wood consumed by kinds and States, 1918.

Species.	New England States and New York, Cords.	Lake States, Cords.	Pa., Md., Va., W. Va., N. C., Cords.	Cal., Ore. and Wash., Cords.
Spruce.....	1,527,001	470,346	171,411	35,385
Hemlock.....	87,326	526,831	76,666	145,583
Fir.....	272,537	88,580	7,000	35,119
	1,886,864	1,085,757	255,077	216,087

In any consideration of the pulpwood supplies we must remember that large quantities of these species are required for lumber as well as for pulpwood. Table III shows the amount of spruce, hemlock and fir used in 1917 for lumber:

Table III.—Amount of spruce, hemlock and fir lumber manufactured in 1917, by regions.

Region.	Feet B. M.
New England States and New York.....	687,746,000
Lake States.....	972,168,000
Pennsylvania, Virginia, West Virginia and North Carolina	607,256,000
Alaska, Washington, Oregon and California.....	1,001,233,000
Total.....	3,268,403,000

In order to add this amount to the amount used for pulpwood it is necessary to convert the board feet to cords. For this purpose it is assumed that 1,000 board feet are equivalent to two cords. As stated above, there are no accurate estimates of the amount of standing timber, but Table IV gives the concensus of opinion of the best experts with respect to these three species, together with the total amount of these species used for lumber and pulpwood, estimated and expressed in cords:

Table IV.—Approximate stand of spruce, hemlock and fir, total annual consumption of these woods, and the number of years the supply would last at the present rate of consumption.

Region	Approximate stand, Cords.	Approximate annual cut of lumber and wood, Cords.	Approximate number of years the present supply maybe expected to last at present rate of cutting.
New England States and New York...	78,000,000	3,262,000	23
Lake States....	56,000,000	3,030,000	18
Pennsylvania, Maryland, Virginia and North Carolina.....	15,000,000	1,470,000	10
Alaska, Washington, Oregon, California. Idaho, Montana.....	540,000,000	2,218,000	243
Total for United States.....	689,000,000	9,980,000	
Average.....			69

At first glance it might seem that a national supply for 69 years makes it unnecessary to worry over this question for some time to come. When we realize, however, that 95 per cent of the pulp and paper mills are located in the East and that the present supplies of spruce, hemlock and fir in this part of the country cannot be expected to last more than 25 years, the importance of the problem is apparent. A pulp and paper mill is a very expensive establishment, usually representing an investment of several million dollars. It cannot be picked up and moved to another section of the country. On the other hand, wood cannot be economically shipped great distances. Even now some of the pulp mills are bringing it more than 300 miles. During the past few years the seriousness of this diminishing supply of wood available for the use of the Eastern mills has been reflected in constantly increasing importations of paper and pulp from Canada.

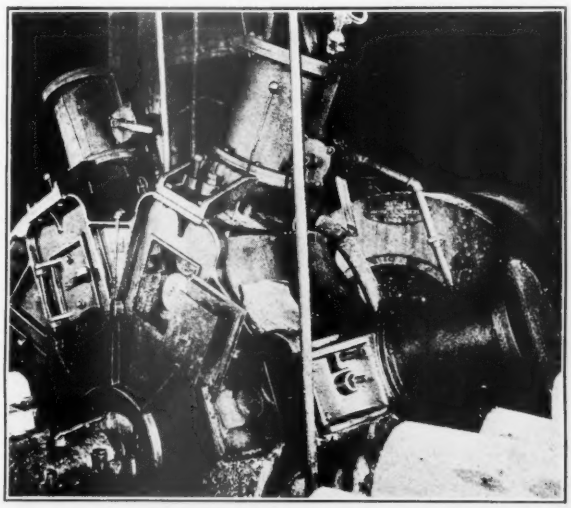
Up to 1909 the country was self-supporting in respect to pulpwood, but since that date the consumption has exceeded the home production. Production continued to increase up to 1915, but since then has fallen off, and the importations from Canada are now constantly increasing.

Several ways of meeting this impending pulpwood crisis suggest themselves. We may rely still further upon Canadian resources, but this will mean the abandonment of many of our mills and the gradual shifting of the paper industry to foreign soil. This might be a source of serious embarrassment under certain conditions, although friendly relations with Canada are not likely to be disturbed. The Canadian Government has wisely, from its standpoint, prohibited the exportation of pulpwood from Crown lands, thus fostering the manufacture of paper in that country. Canada now has altogether 90 pulp and paper mills, which produce a total of about 2,100 tons of paper a day, and 89 per cent of this quantity is available for export, a large part of it going to the United States. In fact, of the paper, wood and pulp used annually in the United States, about one-

third comes from Canada, and the Canadian supplies are by no means inexhaustible.

As the figures in Table IV show, there are ample supplies of pulpwood for a great many years in Alaska and the Northwest, but, unfortunately, only about 5 per cent of the mills are located there. From a national standpoint, of course, making the paper in the United States would be better than importing it from Canada; but, as long as the publishers can obtain Canadian paper more cheaply than they can get paper from the West, they will naturally buy from Canada. There are, however, several factors that will gradually bring Western paper into competition with the Eastern product:

(1) There are great quantities of wood available in the West at stumpage prices of 25 cents to $1.50 per cord,



A GRINDER SUCH AS THIS WILL MAKE 6 TONS OF GROUND PULP A DAY, REQUIRING ABOUT 6 CORDS OF WOOD. A 200-TON PLANT REQUIRES 33 OF THESE GRINDERS AND A LARGE WATER POWER.

as compared with $2.50 to $5 per cord in the Northeast.

(2) Much of this wood is on the National Forests and is, therefore, available without the carrying charges that must be figured against large investments in land.

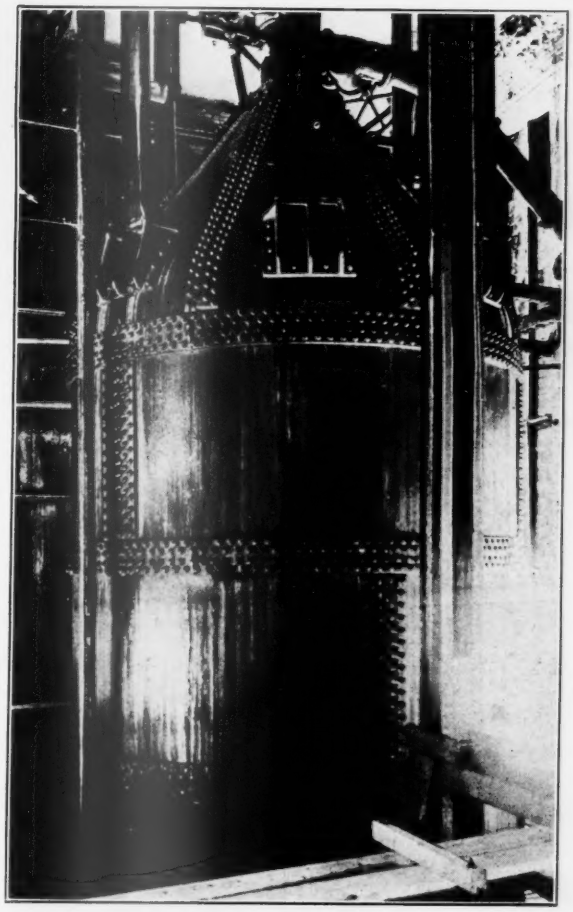
(3) The yield per acre of the forests is much greater than that of the Eastern Canadian forests, and, consequently, smaller areas are sufficient to produce a given amount of pulpwood at a reduced cost of production. The average value of Canadian wood in 1915 was $6.71 a cord, as compared with $8.76, the value of pulpwood in the Eastern United States in 1916. During the war the price paid by some of the Eastern mills was as high as $22 per cord. One of the mills on the Columbia River paid in 1916 an average of $4.82 for white fir, $5.32 for hemlock and $4.36 for Sitka spruce.

(4) There are large water powers available in the West.

Partly offsetting these advantages are the higher cost of wages in the West and the high freight charges to the points of consumption, as most of the publishing is done in the East. Until recently Western paper competed with the Eastern product only as far east as Denver and Salt Lake; but, with the present high prices of paper a small amount of Western paper has found its way into the Eastern market. Western lumber is already competing with Eastern lumber, with the result that much good spruce which should be cut into lumber is going into pulp.

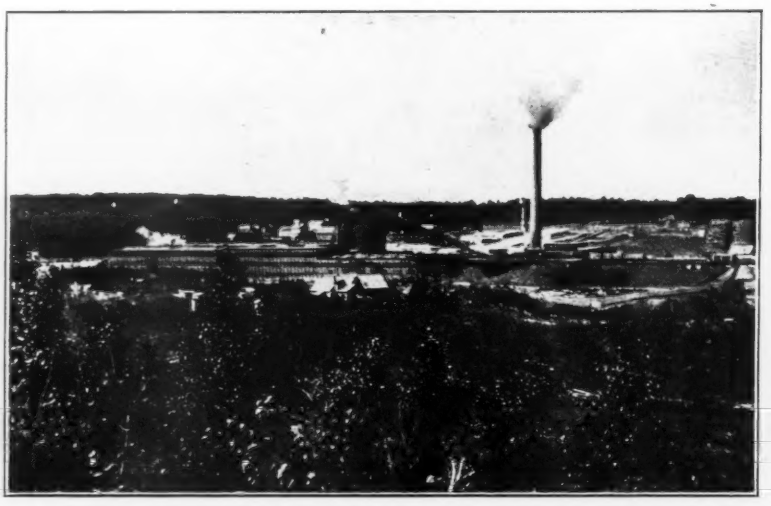
Both of the measures mentioned above, importations from Canada and increased production in the West, are temporary expedients. In the long run, the country must solve the paper problem on the basis of a permanent wood supply. There are two ways of helping to accomplish this, and they require a constructive national policy: (1) The utilization of mill waste for paper making, and (2) the regeneration of our forests on a more productive basis.

Sawdust may be made into pulp, but not economically. On the other hand, mill waste, including slabs and edgings, is well adapted for paper making by the sulphite process. At present only about 3 per cent of the wood used for pulp is mill waste, and this is evidently a very small portion of all the slabs and edgings from the spruce, fir and hemlock that is now being made into lumber. For every thousand feet of lumber manufactured there is a waste of about one-half cord of slabs at



A DIGESTER SUCH AS THIS WILL MAKE ABOUT 15 TONS OF SULPHITE PULP AT A COOK, OR 30 TONS A DAY. SIXTY CORDS OF WOOD CHIPS ARE REQUIRED TO MAKE 30 TONS OF CHEMICAL PULP.

the mill. In the manufacture of spruce, fir and hemlock lumber there must, therefore, be an annual waste of about 1,600,000 cords, much of which is burned in incinerators. The objection on the part of capitalists to building plants to run on mill waste is that lumber operations in any one locality cannot guarantee through a continued period of years a steady supply of wood waste sufficient to justify the large investment required for a sulphite mill. This is an important argument for putting the lumber industry on a permanent basis, and it is quite probable that the saw mill of the future may be run as an adjunct to the pulp mill, the better classes of logs being sawed, and the poorer logs and mill waste being used for pulp. An arrangement of this kind would also save a large amount of wood now left by lumbermen in the forest in the form of tops, and crooked and defective logs, which are well suited for pulp but in some sections are not considered merchantable for lumber. The regeneration of the forests on a more productive basis is the most important measure for perpetuating the paper industry in the United States. In the past, forests have been cut, and little provision has been made for future growth. In the future, operations should be conducted in such a way as to secure an increasing reproduction of species valuable for lumber and pulp. Fortunately, such species as fir and poplar are prolific seeders and may, without difficulty, be reproduced naturally. Spruce may be reproduced under proper methods of forest management, though with more difficulty than is experienced in the case of the two species just mentioned. As the cost of pulpwood increases, investments in plantations, especially in the neighborhood of pulp mills, will commend themselves. The production of large quantities of wood near the mills will greatly reduce the cost of lumbering and of transportation, as compared with the expense of operating remote tracts that furnish a low yield of wood. Young, thrifty-growing forests will produce yields scarcely imagined by one who has been accustomed to deal exclusively with old timber.



A TYPICAL PULP AND PAPER MILL

Although some experiments in forestry by a few pulp companies have been made on a small scale, no adequate steps have been taken by the industry to perpetuate the supplies of wood. Furthermore, no great anxiety seems to exist about the future, although the scrapping of millions of dollars' worth of plants within a period of 10 or 20 years may be entailed.

An expert who recently returned from Sweden, where he had investigated the paper business for the Wrapping Paper Manufacturers' Service Bureau, states in his report that every sulphite mill which owns timber limits has a most important branch known as the forestry department. These mills employ technically trained foresters, prepare very accurate figures in regard to the yearly growth of their forests, and cut no more timber than grows each year. Any wood used in excess of this yield is purchased from Government limits and privately owned tracts. The idea is not new, but it makes clear the desirability of larger holdings in Northeastern United States to be owned, some of them, by the pulp and paper industry, and others by the National and State Governments, and all managed upon this principle of limiting the cut to the amount of the annual growth. In this connection it is encouraging to note that the American Paper and Pulp Association has recently issued a pamphlet entitled "Suggestions for a National Forest Policy with Special Reference to the Pulp and Paper Industry," in which public acquisition of forest lands and more efficient fire prevention are especially advocated.

But it is to the wood-using industries rather than to the lumber companies that we must look for any serious efforts toward the perpetuation of the national lumber supply. In the same way, it is the publishers rather than the pulp companies who must take it upon themselves to see that our national pulp supplies are perpetuated. The newspapers of the country have not always been far-sighted enough to advocate forestry practice as being for the public welfare. They must soon see that it is essential for the perpetuation of their own industry as well as for the good of the Nation as a whole. One of the first steps in this direction should be the making of an accurate census of the timber in the country suitable for use as pulpwood; for, as has been stated above, only rough guesses are at present available. Such a survey would show that definite regions are available for the development of the pulp and paper industry and what detailed measures should be taken to perpetuate the forests.

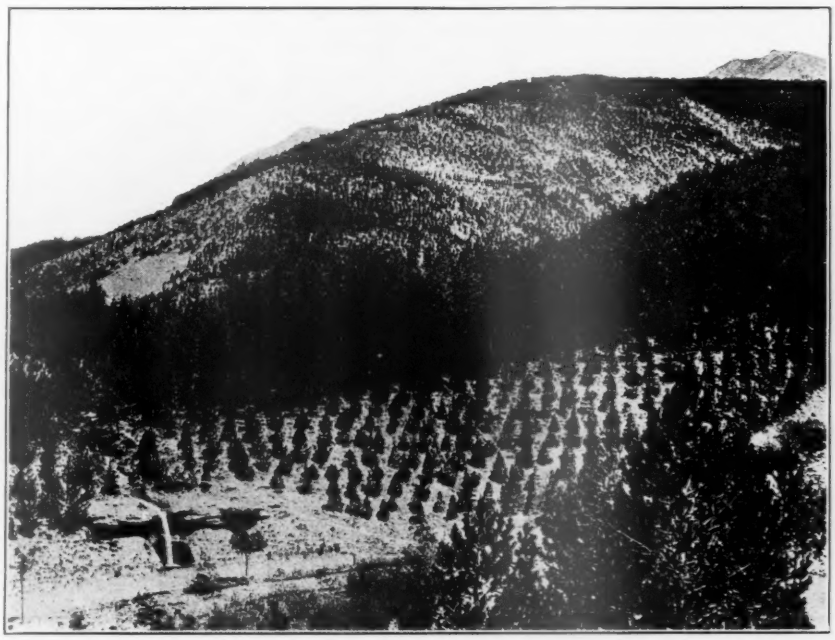
PRIVATE FORESTRY IN FRANCE

BY W. B. GREELEY

FORMERLY LIEUTENANT COLONEL 20TH ENGINEERS

IT was a lumberjack sergeant of the 20th Engineers who remarked that the lumber business in France seemed to be concerned more with growing trees than cutting them into boards. That in a nutshell is the difference between the timberland owner in France and the timber baron of America. The conception of a forest as land producing crop after crop of wood extends from the intensively managed public forests of France down to the peasant who owns half a hectare of poplars in a swampy bottom.

To us in the United States, who are wont to think of forestry as possible only for the nation or state, it is of interest to know that two-thirds of the wonderfully conserved forests of France are owned by private citizens. The technical care of these 16 million acres of private forests does not differ, in essential respects, from that given to the state and communal properties. About 30 per cent of them, however, are devoted to the production of hardwood fuel, with crops every 20 years, whereas the aim of the public forests is to grow as much large timber as possible. Upon her privately owned forests, France thus depends for the bulk of her lumber and fuel wood. Private forestry is a vital factor in her national economy.



Photograph by M. Garbe

A FOREST PLANTATION IN THE FRENCH ALPS

The ownership of forests, for hunting preserves, was highly prized by the lords of feudal France. Many areas were, indeed, kept in forest for the noble's pleasure, that should have been put into farms to support his half-starved tenants. So persistent is this tradition that the ownership of forests is still, in most parts of France, an earmark of gentility. Many of the private forests of today are relics of the old seigneurial estates. In the center of the Forest of Meillant, near Bourges, which was cut by the 20th Engineers, stands a thick stone table of triangular shape, with a colossal stone chair facing each of its sides. Here, according to local tradition, the three lords who formerly owned the forest met to settle affairs of the chase or matters of dispute, each nobleman occupying a chair on his own land. And here was played the game of cards, to settle a controversy or a wager, by which it was determined which of the three seigneurs should own the whole forest. The Marquis of Meillant won, but today his hunting preserve has passed into the hands of a French business man who makes airplane hangars for the government.

Other large areas of forest passed into private hands through the sale of crown and state property during the 50 years following the Revolution. This movement was analogous in many respects to the alienation of our own public domain, and marked the reaction of French individualism from the former power and functions of the state. A third source of private forests as we find them in France today was the planting of large areas in the southern sand plains and in the central and northern valleys about the middle of the last century. The successful forestation of the southwestern sand dunes by the government led to the planting of 1,500,000 acres of private holdings in the Landes and Gironde with maritime pine. At about the same time, several factors, particularly the shortage of agricultural laborers, brought about the reforestation of farm land in the Valley of the Loire and other highly developed parts of northern France. Many of the forests of Scotch pine in this region, which furnished thousands of poles and piles for the allied armies, were planted from 40 to 60 years ago.

Among the economic conditions which keep these 16 million acres of privately-owned land in continuous wood

crops, we recognize first of all the fact that France is a *wood-importing* country; and hence that the timber grown in her forests not only has a high value but is very closely utilized as compared with standards in the United States. The hardwood coppice, or sprouts, which furnish the bulk of the wood fuel of the country and were cut over enormous areas to keep the American Army warm, have an average value on the stump of probably $4.00 per cord. The value of a fuel crop grown on a well managed forest in 20 years ranges from $50 to $60 an acre as it stands in the woods; and an additional stumpage return is usually realized from the small brush or fagot wood. The stumpage values of the principal timber trees of France averaged, in 1917, at least five times the prevailing prices of similar species in the United States. Maritime pine stumpage in the Landes, comparable to rather low grade shortleaf pine in the southern states, sold for around $26 per thousand board feet. The oak timber of all grades, bought by our Army in the Loire River Valley and in the upper watershed of the Marne, probably averaged $36 per thousand board feet on the stump. The silver fir and spruce which we obtained in the Vosges and Jura Mountains, timber averaging 6 or 8 logs to the thousand feet, cost about $50 per thousand standing in the forest; but in buying selected piling we sometimes exceeded $90 per thousand board feet. And do not overlook the fact that these prices were obtained for stumpage grown as thick as the species and class of product permit in forests where no ground is wasted; and that they apply to all parts of the tree which can be utilized under the most intensive manufacturing standards.

The prices quoted are war-time rates, probably 75 per cent more than the stumpage values existing in 1914. On a pre-war comparison, however, the disparity between timber values in France and in the United States is very great. This difference is due not only to the shortage of supply and the necessity of importing a third of the lumber which the country uses. Low conversion costs due to the accessibility of the forests and particularly to the very low wages paid to forest labor are an important factor. The average French logger and mill-hand received probably five francs, or less than one dollar, per day in 1917, and this was considerably more than he was paid prior to the war. The simple and primitive methods of manufacture, by small, local mills, with almost no investment or overhead charges, are relatively inexpensive. With lumber values the country over influenced by the price of stock imported from the Baltic or other outside sources, with keen competition for all stumpage put upon the market, the standing timber gains the benefit of the low costs of manufacture. The stumpage owner holds the whip-hand. Hence the situation in the United States, where manufacturing cost is the chief element in the mill price of lumber, is largely reversed in France. The standing tree often claims a third or more of the selling price of its products.

The presence of large areas of non-agricultural land in France is a second economic basis for her private forestry. Her eastern mountain belt, extending from the Vosges to the Mediterranean Sea, her rugged Central Plateau, the northern slope of the Pyrenees, the southwestern sand planes, and the chopped-up hills in the upper reaches of the Marne and Seine contain a large aggregate of land fit only for forest or grazing. Intensive use of such areas is an economic necessity in a country so densely populated, and the bulk of her private forests are found in these non-agricultural regions. They are not limited, however, to areas too poor for cultivation. The economic balance between forest and farm crops has shifted at various periods in French history. At the time of the Revolution, the country was short of agricultural products, especially cereals; and a large acreage of forest was put in tillage. Fifty or sixty years later, the pendulum swung back. Shortage of farm labor appears to have been the immediate cause. At all events, many rural proprietors in central and northern France, finding their fields lying fallow year after year, resorted to tree planting. There has been no important change since that time with probably a slight tendency in later years to increase the farm area at the expense of the forest.

We in the United States follow the inflexible rule that the farm must always be given right of way over the forest; and doubtless that is the safest guide in our present stage of development. The economic growth of France has carried her beyond such broad assumptions. The demand for wheat and the profit in growing it compared with the demand for timber and fuel and the profit in growing these products are the considerations which govern. The area devoted to forest is fixed by the balance struck—over comparatively long periods of time—between all the economic necessities of the country; and that balance has not thus far limited her forests, either publicly or privately owned, to non-agricultural lands. This sort of readjustment is already impending in some of the older parts of the United States.

While such economic factors are at the bottom, we cannot understand private forestry in France aright without considering the conservative temper of her people, their contentment with comparatively low returns, their instinctive resistance to change in the accustomed order, so unlike the restless American, and that æsthetic value universally accorded to their forests. I have already referred to the social prestige carried by forest ownership. Many forests have been preserved as a beautiful setting for a chateau or as hunting grounds, their financial returns being a secondary consideration. Large areas of woodland, on the other hand, are held as safe, long-term investments. The vast fortunes of the Rothschild family include a number of large forests in central and northern France. Forest properties are highly regarded as stable securities for the investment of family or institutional funds. Well managed oak and beech forests yield net revenues of from 2½ to 4 per cent. Such forests furnish a crop of coppice fuel wood every 20 or 25 years and at the same time usually carry an over story of high-grade timber, which may require

200 or 240 years to mature but is actually harvested in small quantities at every periodic cutting. A large forest property is split up into lots or compartments, containing sprouts or timber of different ages. Some material is harvested every year or at least at intervals of every 4 or 5 years. There is thus an actual current revenue—proportioned to the size of the whole investment; and the problem of accrued carrying charges, which is so burdensome to the owner of undeveloped timber in the United States, scarcely exists in France.

Forestry as a commercial business is most highly developed in the pineries of the Landes, where the low value of the land and the combined yields of naval stores and timber make it exceptionally profitable. Net returns of 6 per cent on the investments in southern pineries are not uncommon. Here also the revenue is practically continuous. The larger properties contain blocks of timber of varying ages; and, aside from a steady return from turpentine orcharding, realize every few years upon a small cut of stumpage.

A CAMOUFLAGED ROAD THROUGH A FRENCH FOREST BETWEEN CLERMONT AND VARENNES

The great bulk of the French forests are in separate hands from the timber using industries. This, in my judgment, is a factor of importance in their conservative management. The forest is not the tail of the sawmill, but is relatively independent of the sawmill. Such would be the inevitable tendency in a country where timber is scarce and dear. The forest owner determines the amount and location of the stumpage which he wishes to cut from year to year. Foresters or forest rangers are employed on all of the larger properties, and the cutting area is selected, marked, and estimated by them. The timber is then advertised, as a rule, and sold at auction for the highest lump sum offered. The sawmills are uniformly small and most of them are portable. In the eastern mountains and other regions of extensive forests, there are many little stationary mills, driven by steam or water power, which obtain their logs from the yearly cuttings on any one of a dozen or more forest properties in their vicinity. Logs are hauled by ox teams, in full tree lengths, for distances up to 15 or 20 miles to these little mills. In the level pineries of the south, a light steam tractor of the "locomobile" type, operating a little band saw 3 or 4 inches wide, is almost universal. These little mills roam about the Landes, picking up a few hundred cubic meters of timber here and there, sawing it into boards, and then passing on, leaving neat, triangular cribs of lumber to be hauled out by the two-wheeled mule carts of the region whenever it has seasoned sufficiently.

In a word, the lumber manufacturing industry has grown up upon and adapted itself to a system of forest management which permits but small cuttings at any one place in any one year or series of years. Cases are rare when the well being and permanence of the forest are sacrificed to the requirements of a manufacturing enterprise—an exact opposite of the situation so common in the United States where the manufacturer owns the timber and has denuded one forest region after another in order to supply his large, stationary mills to their maximum capacity. While this relation is largely a result rather than a cause of the economic status of private forestry in France, it indicates the industrial adjustments which will become necessary in America as our emphasis shifts from supplying sawmills to growing timber.

The public policy of France toward her private forests is an interesting compromise between the restrictions of the imperial regime and the present day spirit of personal liberty. Under the Louis' the use and treatment of privately owned timberland were very closely regulated even to the marking of the trees which might be cut, by the king's foresters in some instances. This maze of harsh and burdensome restrictions was wiped out by the French Revolution, and for a considerable period private forest owners cut or destroyed as they chose. Then Nineteenth Century France, confronted with a shortage of fuel and lumber and awakened to the flood menace from her denuded mountains, reacted toward the old conceptions of restraint but only to the limited degree that the intrenched individualism of the republican era would permit. Under the law of 1859, which has been modified but little since enactment, the private forest owner is still free to cut his timber as he chooses; but he is responsible to the state not to *uproot* or destroy any forest area in excess of 25 acres without permission in advance.* Violations of this law are judged solely by the condition of the land, by the fact that forest denudation has actually taken place. Whether the disappearance of the forest resulted from the method of cutting, from over-grazing, from fire, or from deliberate clearing for tillage is immaterial. So is the intent or good faith of the owner. Whatever the

*This restriction does not apply to planted woods under 21 years in age or to trees within enclosed parks or gardens adjoining dwellings. The destruction of other areas up to 25 acres without warrant is permitted only in the case of isolated patches of forest which are not situated on the slopes or summits of mountains.

cause of "defrichement," the owner of the land is liable to a fine of from $35 to $115 per acre. He may also be ordered by the Minister of Agriculture to reforest the stripped area within a prescribed period.

These penalties may be avoided by obtaining permission to denude forest land in advance. The procedure is cumbersome, involving a declaration of intent by the owner of the land, an examination of the area by forest officers, reviews of the case by various administrative officials, and final decision by the Minister of Agriculture. The government may refuse permission to denude forests only when their preservation is necessary to protect stream flow, to prevent erosion or the shifting of sand, or to safeguard the public health or national defense. Many attempts have been made to include the timber needs of the locality or of the country at large among the reasons upon which the administration may refuse a warrant to destroy private forests; but none of them have yet overcome the resistance to this invasion of the individual liberty of the property owner.

During the Nineteenth Century, the denudation of about one and a quarter million acres of private timberland was authorized, mainly in the lowland hardwood regions.* With its limited application, the practical value of the law lies largely in its support of the efforts of the government to prevent deforestation in the mountains. It is of special interest to Americans, however, because it illustrates the point of view of the French toward their forests. A people fully as democratic and liberty-loving as we are has infringed the rights of private ownership more sharply in the case of forests than any other kind of property. The significance of this infringement can be appreciated only in a full understanding of the *sacredness* of private property in France. The French have done this because they put forests in a class by themselves. The public interests dependent upon the forests of the country and the lapse of time required to restore woodland once destroyed are, to the French, sufficient grounds for imposing special burdens and obligations upon owners of forests from which owners of other forms of property are Scot free.

On the constructive side, the special and distinctive public value of forests is recognized in their taxation. Forest plantations on mountain slopes or summits and on sand dunes or other barrens are exempted from taxes for a period of 30 years. When cultivated land is planted with trees, three-fourths of the taxes are remitted during the first 30 years. When land is planted which has lain fallow for a considerable time, the law provides that there shall be no increase in the assessed value, or rated income, of the ground for a like period. Aside from these exemptions, private forests in France are taxed on their current income, a method which dates back to the Revolutionary period. Under the law of 1907, a valuation commission periodically classifies the lands in all forms of culture, commune by commune, in accordance with their relative productivity. There may thus be three or four types of forest, as determined by their soil and timber species and the value of their products. A net yearly income is then obtained for average areas within each type. All forest properties shown on the official survey and plats of the commune are thus classified and a net income, based upon the sample tracts studied, is assigned to each.

The periodic revenues customary in French forests, where nearly all properties harvest some products every few years, are, under this system, reduced to an annual basis which represents the net returns for stumpage after deducting costs of upkeep, fire protection, forest guards, thinnings, planting blanks, and other cultural measures. The tax is levied upon this net income and usually amounts to 8 or 10 per cent, about half of which goes to the central government. The rest comprises the departmental and communal taxes and levies for local roads. It is of interest to note that French forest owners are demanding a straightout yield tax levied upon forest products when actually cut, the same principle which is generally regarded as the basis for forest tax reforms in the United States.

While the tax system is a distinct aid to private forestry in France as compared with American conditions, it is probable that the greatest public encouragement to the private owner to keep his timberland productive has been the stimulus and example of the publicly owned forests. These are scattered through practically every section of the country. In every forest region, the private owner has seen good forestry practice demonstrated for scores of years on state or communal holdings. He knows the forest officers in his locality and consults them on the methods applicable to his own woodland. The widely distributed public forests have not only set the standards of good management but have made the local silviculture a part of the farm lore of the region. The rural population of France knows how to grow trees just as they know how to grow potatoes or care for their vineyards. One day I met a wooden-shod peasant boy in the Landes who told me all about the handling of their pineries from thinning out the over-dense stands of young trees through the various stages in turpentining to the cutting of the timber. It was all part of his daily life. The educational value of her public forests has, in my judgment, done more to stimulate private forestry in France than any other public activity.

The French government has made special efforts in recent years to extend this educational influence by various forms of co-operation with private forest owners. Special recognition is given by law to associations of forest owners who desire to act collectively in the protection or management of their properties. And, by a law, passed in 1913, the expert services of the State are offered, at cost, to owners of timberland who wish to cut their holdings on a conservative basis corresponding to the requirements of the "regime forestier" and to obtain the special forms of protection against trespass now accorded to public holdings by the forest code. This law is of too recent origin to have yet demonstrated its value.

* These records go back only to 1828. Large additional areas were authorized between 1828 and 1803, when the first law was enacted. Many forests were also destroyed between 1791 and 1803 when no permits were required.

but it illustrates the trend of public forest policy in France.

Private forestry is, of course, on a totally different footing in France than in the United States. The dense population of France has of necessity brought about a relatively high value and a relatively intensive use of all classes of land. The shortage and high cost of timber products have given an economic impetus to the practice of forestry by private land owners which is approached in but limited parts of the United States. Notwithstanding the economic basis for forestry in France, which makes the growing of timber reasonably profitable, notwithstanding also her intensive demands for farm crops, France has found it necessary to place her forests under special protection and to enact special laws restricting the rights of private ownership in forests as distinct from all other forms of property. That broad fact is food for American reflection.

Lack of cheap lumber is an economic handicap in France. It is apparent particularly in her rural districts, where a new structure of any kind is a rare sight and the ancient, moss-covered farm buildings give an impression of decadence which is only partly real, but nevertheless, portrays forcibly the low standards of rural improvements which not only reduce the comfort and wholesomeness of country life, but inevitably lower the efficiency of agricultural industries. The per capita consumption of lumber in France is not more than 100 board feet per annum, less than one-third that of the United States. In other words, France illustrates the evils of a condition where lumber is a luxury, in part—an imported luxury. Her eighteen per cent of forested land is not enough. Her intensive forestry can but partially offset the effects of a shortage of timber-producing land. Hence the necessity of a national policy of forest preservation even at the cost of a reduction in farm crops.

It is not yet our problem in the United States to strike a close balance between the forest and the farm. That can be left to the economic adjustments of the future. It is rather our problem to put *idle land* to use. Production from land is just as important in the long run as production by labor or industrial organizations, about which so much is being said these days. The situation of France today is a striking warning that the United States can ill-afford the national loss of idle land. Public agencies doubtless must assume the greater part of the immediate task of growing timber on our idle cut-over land. But publicly owned forests cannot do all of it in the United States any more than in France. Our national policy should aim definitely and unequivocally at the practice of forestry by private owners as rapidly as that can be brought about by better methods of taxing timberland, by the co-operation and educational help of state and federal agencies, and by the recognition, on an equitable basis, of the obligations carried by forest ownership.

SIGNIFICANT TRENDS IN LUMBER PRODUCTION IN THE UNITED STATES

BY FRANKLIN H. SMITH, STATISTICIAN IN FOREST PRODUCTS

THE demands for wood made upon our forests are of greater importance each succeeding year, because of the annual growth in population and the gradual utilization of the surplus timber of the country. In the absence of any but rough approximations of the quantity of timber standing in the forests, the inroads being made upon the supply can be no more than assumed. The assertion, however, that the annual harvest is much greater than the annual growth is unquestionably well founded. As a basis for the contention that the vast supply has been and is being seriously impaired, one has but to point to the shifting centers of production as the available timber of a region is well harvested and the needs of the country are necessarily drawn in greater volume from some other region. Going back to the middle of the last century, we can distinctly trace the history of the lumber industry of the country at ten year intervals by showing the relative importance of the several producing regions. This has been done in Table 1.

A glance at the tabulation shows that in 1850 almost three-fourths of all the lumber was produced in two general regions—the northeastern group and the central group of States. The first named region embraces Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, Pennsylvania, New Jersey, Delaware and Maryland. The second, or central group of States, includes West Virginia, Kentucky, Tennessee, Missouri, Illinois, Indiana and Ohio. In 1918, or nearly seventy years later, the combined production for these two regions formed but 15 per cent of the total for all States. As the forests of New England and contiguous territory were depleted, the major activities of the lumber industry moved westward into the Lake States. Here the production rose from 6 per cent of the country's output in 1850 to a maximum of 35 per cent in 1880-1889, dropped off to 25 per cent in 1899 and to 10 per cent in 1918. For the southern group of States the per cent of total cut rose from 8 per cent in 1850 to 35 per cent in 1918. A later generation tapped the forests of the Pacific Coast group of States; the group contributed 8 per cent of the nation's lumber product in 1899, 15 per cent in 1909, and 27 per cent in 1918. The last figure rather startlingly directs attention to the decadence of the industry in other regions.

Some of the older men in the lumber industry today—and there are several patriarchs who have enriched our history of the lumber industry—have witnessed these

great changes and shifting scenes of production. It is remarkable that in the lifetime of such a man so many changes could be worked in the development of one of the leading resources of the nation. Within the allotted "three score years and ten" three immense regions have been divested of their forest cover to a large extent, and the fourth, the southern pine region, has reached its apex of production. No other land was ever more generously blessed with timber or timber so well adapted to man's needs as our own great stretch of country. Perhaps it has been the very great abundance of wood on every hand that has caused us as a people to value it lightly and countenance its ruthless destruction by fire and improvident lumbering methods.

There is an economic feature in this shifting of regions of production which stands out boldly like a figure outlined against the horizon. The figure in this case is the burden of transportation that puts its load on the consumer as the proverbial thumb of the butcher or grocer tips the scales when weighing our minor purchases of food. In 1850 the sawmill and consumer were within a reasonable distance of each other, and many communities secured their supply of wood from local mills. A decade or two later, as the timber near at hand became well cut out, the mills moved farther away. Still the distance lumber had to be hauled was not great and the cost was lessened by the use of rivers and canals for the movement of logs and lumber. With the timber supply and the bulk of the consumers ever getting farther apart, however, the economic burden of transportation has been laid upon the consumer and becomes increasingly heavy each year. In 1850 the center of population in the United States was Parkersburg, West Virginia. In 1910 it had moved to Bloomington, Indiana, or northward and westward, while the main production of lumber shifted to the southern and far western States. This transportation cost burden is a heavy one. Take a city like Philadelphia, for instance. In the earlier days rafts of logs and lumber coming down the Delaware and Schuylkill Rivers supplied the inhabitants of the city with wood. Then the big stores of white pine and hemlock in central Pennsylvania were unlocked by the lumbermen and much of Philadelphia's share was brought down the Susquehanna River and its tributaries, through the old Chesapeake and Delaware Canal and then up the Delaware River to the city. The water borne traffic was carried at a minimum of expense, possibly $1.50 or 2 a thousand feet. Subsequently the movement of western Pennsylvania lumber and still later that of the Lake States was by rail, and the transportation tax increased possibly to $2 or $3 a thousand feet. Today the freight charge amounts to from $7 to $8 a thousand feet on North Carolina pine, $9 to $11 on southern yellow pine, $11 to $14 on southern hardwood, while the freight charges on Douglas fir loom large at from $20 to $24 a thousand feet. In some instances the transportation charges alone

LAKE STATE GROUP 352 BILLION FEET
NORTHEASTERN GROUP 313 BILLION FEET
PACIFIC GROUP 180 BILLION FEET
ROCKY MOUNTAIN GROUP 31 BILLION FEET
ALL OTHER GROUP 26 BILLION FEET
CENTRAL GROUP 236 BILLION FEET
NORTH CAROLINA GROUP 116 BILLION FEET
SOUTHERN GROUP 360 BILLION FEET
PACIFIC GROUP: California, Nevada, Oregon, Washington
ROCKY MOUNTAIN GROUP Arizona, Colorado, Idaho, Montana, New Mexico, Utah, Wyoming.
ALL OTHER GROUP: Iowa, Kansas, Nebraska, South Dakota.
LAKE STATES GROUP: Michigan, Minnesota, Wisconsin,
CENTRAL GROUP: Illinois, Indiana, Missouri, Ohio, Tennessee, West Virginia, Kentucky.
NORTHEASTERN GROUP: Me., N.H., Vt., Mass., R.I., Conn., N.Y., N.J., Penna., Del.
NORTH CAROLINA GROUP: North Carolina, South Carolina, Virginia.
SOUTHERN GROUP: Alabama, Arkansas, Florida, Georgia, Louisiana, Texas, Mississippi, Oklahoma.

TOTAL LUMBER PRODUCTION 1850-1918 IN THE UNITED STATES BY GROUPS OF STATES

are the equivalent of the cost laid down in Philadelphia years ago of the Keystone State's justly famed cork white pine.

In the last 69 years—the period 1850-1918, inclusive—the forests of the United States have yielded approximately 1,614 billion board feet of lumber alone; how much more material, such as fuelwood, pulpwood, cooperage stock, and the like, can not be easily estimated. On the basis that 219 cubic feet of timber is utilized in producing a thousand feet of lumber, the total output of 1,614 billion board feet of lumber required the utilization of 353,466 billion cubic feet of timber, a figure too big to be readily comprehended. Assuming an average stand at five thousand feet per acre throughout the country, the 1,614 billion feet cut would represent the equivalent of cutting over 322,800,000 acres or an area as great as the combined surface area of the 18 States bordering on the Atlantic and embraced by a line drawn on the west to include New York, Pennsylvania, West Virginia, and Alabama—truly a vast area to be cut over.

The accompanying outline map of the United States shows the total production for each of the eight general lumber production regions for the period 1850-1918. A striking feature of the statistics as applied to the several regions is the close approach of the figures for three of the older regions; namely, the northeastern group, the Lake States group, and the southern group of States, with an aggregate cut of 313, 351 and 359 billion feet, respectively.

The lumber industry, the foresters, and even the Government itself have been placed at a disadvantage and sometimes embarrassed by the absence of reliable data on our timber resources, since with one exception there has never been any real effort made toward closely reckoning the stand of timber in the United States. Some of the latter day statements are perhaps no more misleading than that of more than a century ago, when it was reported in England that the New World could not supply spar timber for more than a few years longer. The single effort to estimate the stand was the survey made by the Bureau of Corporations in 1908-1909, which has been subjected to revision with passing years as facts developed. It is true, of course, that what a comparatively few years ago was looked upon as inaccessible timber or valueless species is now classed as accessible or commercial, and allowance needs to be made for similar changes in the years to come. There is a reasonably definite present-day knowledge of current timber needs; it is the dearth of data relative to the timber available that makes the future outlook unsatisfactory. Statistics on the production of certain forest products and on the consumption of others covering a series of years permit of an intelligent understanding of the demands upon our forests, and certain deductions may be drawn from these statistics as to the volume of the demands for the immediate future with their relation to the circumscribed knowledge of the actual supplies. But until a more intensive inventory is completed of what the forests of the country hold in the way of supplies, the lumbermen and the foresters and the public cannot advance far; because science demands exactness, without which scientific principles are impossible of formulation.

The major demands made annually upon the forests, based upon the latest available statistics, are shown in Table 2. In the first column the volume of production or consumption is expressed by the common unit of measurement; in the second column the equivalent is given in board measure; and in the third column the

Table 1—Lumber Cut By Groups of States, in Per Cent of the Total

Groups	1850	1860	1870	1880	1890	1900	1909	1918
Total	Per cent 100.0	Per cent 100.0	Per cent 100.00	Per cent 100.0	Per cent 100.0	Per cent 100.0	Per cent 100.00	Per cent 100.0
Northeastern group	54.8	37.0	37.8	25.8	19.8	16.3	11.7	7.4
Central group	18.6	21.1	20.0	18.4	13.1	16.1	12.3	7.8
Southern group	8.5	13.0	6.9	9.7	15.6	24.0	33.3	34.9
North Carolina pine group	5.1	4.8	2.5	4.1	4.7	7.7	11.6	8.3
Lake States group	6.3	13.6	24.4	34.7	34.6	24.9	12.3	10.1
Pacific group	5.9	6.4	4.0	3.6	8.5	8.3	15.5	26.9
Rocky Mountain group	0.0	.1	.9	.9	1.1	1.6	2.9	4.4
All other	.8	4.0	3.5	2.8	2.6	1.1	.4	.2

Northeastern group
Connecticut, Delaware, Maryland, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont.

Central group
Illinois, Indiana, Kentucky, Missouri, Ohio, Tennessee, West Virginia.

Southern group
Alabama, Arkansas, Florida, Georgia, Louisianna, Mississippi, Oklahoma, Texas.

North Carolina pine group
North Carolina South Carolina, Virginia.

Lake States group
Michigan, Minnesota, Wisconsin.

Pacific group
California, Nevada, Oregon, Washington.

Rocky Mountain group
Arizona, Colorado, Idaho, Montana, New Mexico, Utah, Wyoming.

All other
Iowa, Kansas, Nebraska, South Dakota.

approximate cubic contents of wood drawn from the forest to produce the products are enumerated. Several important products of the forest were omitted from the list, since they are incidental industries not directly representing a consumption of timber or wood. These additional products include turpentine and rosin—or naval stores, as they are sometimes called—hemlock and chestnut oak bark used in tanning, and the sap of the maple trees utilized in making maple sugar and syrup. The value of these crops runs well into the millions of dollars each year.

The tabulation indicates the annual use of the equivalent of 91 billion board feet of timber for all purposes in the United States. A substantial basis exists in nearly every instance for the figures given, and they may be regarded as conservative rather than overdrawn. Where statistics for a series of years were available, an average figure was used in place of the data for any one specified year in order to eliminate possible abnormalities. To produce these 91 billion board feet every year requires a yield of 23½ billion cubic feet of timber—a stupendous crop and worthy of the most prodigal nation.

Assuming a population in 1919 of 108,000,000 in the United States, the per capita drain on the forests is 219 cubic feet. The term drain is used in place of consumption, since no consideration is given nor deduction made in this article for material exported; such deduction, however, would not materially change the figures because of the tendency of imports to counter-balance exports. A per capita drain of 219 cubic feet is a heavy tax on the producing ability of our forests, and a heavier levy than is made by any other nation on its timber resources.

The timber situation in the United States may be likened to that of a man who years ago fell heir to a large fortune in cash and who has continued to check against the account most liberally without concerning himself about his balance. In all probability he has drawn more than the interest earned each year, but he is not certain even of this fact because he knows not what part of his principal remains. And so it is with our forest resources—we have gone on drawing heavily upon them each year without knowing what remains or what the annual increment or volume of new growth may be. The fact is substantiated by the data given in Table 1, that certain producing regions have been pretty well cut out. This in itself should be sufficient to convince the most skeptical that our raids on the standing timber of the country have been very successful in reducing the available supply.

How vital our forests are to the commerce and industry of the country can be better appreciated by quoting a few figures. Fifty-two thousand, or 19 per cent, of the 276,000 manufacturing establishments in this country use wood solely or in part as raw material. These 52,000 establishments furnish employment to 1,130,000 wage-earners, or 16 per cent of the 7,000,000 wage-earners in the United States. Whatever goes toward curtailing the supplies of raw forest products to these establishments tends to rupture the continuous employ-

Table 2—Annual Consumption of Timber in the United States.

Form Used	Quantity Produced or Consumed	Equivalent in Feet Board Measure	Cubic feet of Timber Required to Produce
Total		91,308,000,000	23,611,556,000
Fuelwood	110,000,000 cords	36,663,000,000	10,450,000,000
Lumber	37,300,000,000 ft. B. M.	37,300,000,000	8,168,700,000
Fence Posts	900,000,000 posts	4,500,000,000	1,800,000,000
Hewed cross-ties	87,500,000 ties	2,625,000,000	1,050,000,000
Pulpwood	4,550,000 cords	2,548,000,000	532,350,000
Round mine timbers	250,000,000 cu. ft.	1,500,000,000	325,000,000
Shingles	8,850,000,000 shingles	885,000,000	194,700,000
Wood Distillation	1,550,000 cords	868,000,000	181,350,000
Tanning extract wood	1,250,000 cords	700,000,000	146,250,000
Veneers	650,000,000 ft. logs	780,000,000	119,600,000
Tight staves	286,000,000 staves	286,000,000	95,238,000
Vehicle stock	300,000,000 ft. B. M.	300,000,000	90,000,000
Slack staves	1,010,000,000 staves	337,000,000	66,660,000
Woodenware	350,000,000 ft. B. M.	350,000,000	56,000,000
Poles	4,250,000 poles	255,000,000	55,250,000
Handles	200,000,000 ft. B. M.	200,000,000	50,000,000
Slack heading	61,000,000 sets	122,000,000	49,471,000
Hewn and rough export	200,000,000 ft. B. M.	200,000,000	45,000,000
Lath	2,375,000,000 lath	475,000,000	35,625,000
Tight heading	21,000,000 sets	84,000,000	34,125,000
Excelsior	200,000 cords	120,000,000	23,400,000
Hoops	333,000,000 hoops	100,000,000	19,647,000
Piling	1,500,000 pieces	90,000,000	19,500,000
Ship building	10,000,000 ft. B. M.	10,000,000	2,190,000
Furniture	10,000,000 ft. B. M.	10,000,000	1,500,000

ment of a vast army of wage-earners and affects the larger army of their dependents. In a nutshell, then, we have it that one-fifth of all the manufacturing establishments and one-sixth of all the wage-earners in Uncle Sam's vast domain would be adversely affected by any reduction in the supply of materials from the forests.

"What are you going to do about it?" was the pertinent and impertinent question of the small boy when rebuked for pulling the plums out of the pudding. In the particular case of timber, the answer is more easily found. Timber is one of the things God has provided for mankind and made to grow on hillside and valley in plain sight. It is a natural resource that is not hidden. It can be seen and estimated. That is the answer. To make an estimate will require time, money and an organization intelligently directed. Since the welfare of so many wage-earners together with investments aggregating billions of dollars of capital, depend upon an estimate being made despite the expense, I predict that some day Congress, reflecting public sentiment, will require that a timber census be made, and that day should not be far off.

THE NEWS PRINT PAPER SITUATION

BY R. S. KELLOGG

THIS is most truly a Paper Age, and, in the United States at least, a Newspaper Age. The consumption of news print paper has gone far beyond the limits that would once have been predicted by the most enthusiastic advocate of the newspaper as a source of popular information and education. In 1880 we were able to get along with 3 pounds per capita of news print paper. By 1894 our requirements had increased threefold, to 9 pounds, and 25 years later, or in 1919, the consumption of news print paper per capita in the United States was 33 pounds, or more than 10 times what it was 39 years earlier.

Leaving all the other means of publicity out of the question, the average circulation of the daily newspapers in the United States is now some 27,000,000 copies, or one for every family in the country, and a large proportion of these papers are not small ones, either. There are something like 70 newspapers with a daily circulation of 100,000 copies or more each, and for the past year these papers have averaged about 23 pages on week days, while the number of pages in those publishing Sunday editions has been over three times as great as in the daily editions.

The production of news print paper in the United States and Canada is a common industry with common markets. The total output last year was 2,183,000 tons, and 90 per cent of this total is classified as standard news, such as is used by the daily papers. In the form of sheets last year's production of news print in North America would cover 10,000,000 acres or belt the earth 50 miles wide. In the form of a standard 73-inch roll it would unwind 13,000,000 miles, or little more than 7 years' output at the same rate would reach from the earth to the sun.

The annual increase in production figured on a compound interest basis has averaged 6 per cent for the last 15 years. In 1904 the production in the United States, in round numbers, was 913,000 tons, and practically none in Canada. In 1913 the production in the United States slightly passed 1,300,000 tons, and that in Canada amounted to 350,000 tons. Since 1913 there has been little increase in the United States output, but a steadily ascending production in Canada, which in 1919 passed 800,000 tons, while the production in the United States amounted to 1,375,000 tons.

For the last six months the newspapers and trade journals have devoted much space to the discussion of a so-called shortage in news print supply, but there has been no shortage so far as production is concerned. It has been due entirely to greatly increased consumption. The mills have been producing more news print than ever before in history, and the stringency in the market has come about entirely through the efforts of the publishers to use more paper than has been produced. This, of course, has been caused by the tremendous increase in advertising, while there has been little decrease in circulation over the high levels reached during the time of great demand for news during the war. During the past few months the total stocks in the hands of newspaper publishers or in transit to them have averaged between 30 and 40 days' supply, as compared with more than 60 days' supply during the summer of 1918, when the war was nearing a climax. On the other hand, mill stocks have been averaging only 3 or 4 days' production, thus showing the absolute necessity for an unbroken flow of paper from mill to publisher.

Notwithstanding an increase of 185,000 tons in news print production in 1919 over 1918, new machines to come into operation in 1920 will, if all goes well, turn out nearly 90,000 tons of paper, while numerous other new machines are scheduled for 1921. If plans now actually under way are consummated, by this time in 1922 new machines and new plants not in existence in 1919 will be in operation with a total capacity in excess of 1,500 tons per day. This would seem to be ample to take care of the requirements of the publishers, but to predict consumption so far in advance is hazardous.

Newspaper advertising in 1919 was about 40 per cent more in volume than in 1918, and it is starting off in 1920 some 40 per cent in excess of the amount during the first part of 1919. Advertising experts insist that there is a perfectly tremendous volume ahead.

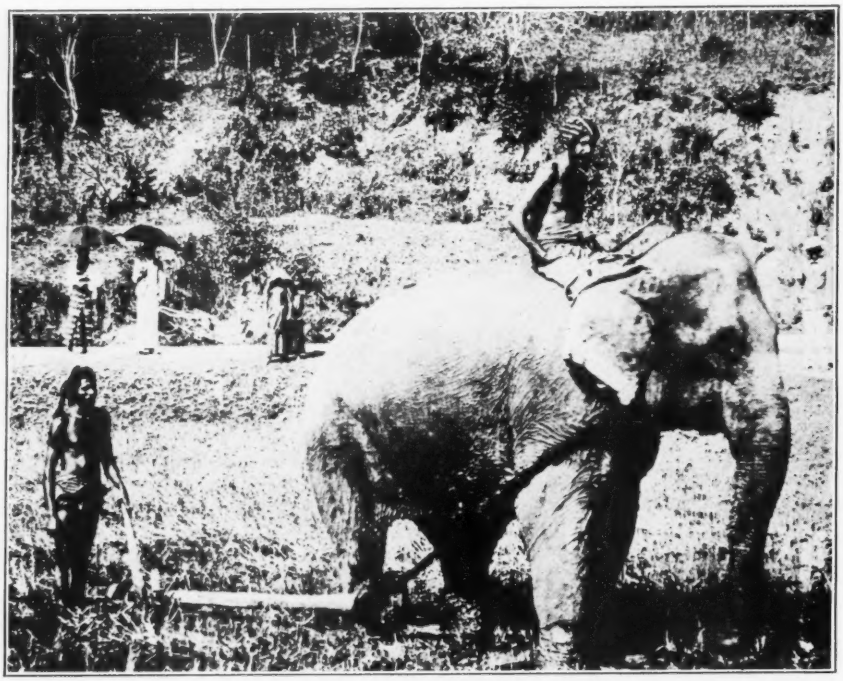
THE USES OF WOOD

WOOD IN AGRICULTURAL IMPLEMENTS

BY HU MAXWELL

A GENERAL difference is understood to exist between agricultural implements and farm tools, but the difference is not always clear or always observed. The two classes overlap and it is not always easy to determine which is tool and which is implement.

If it is understood that tools are operated by human muscle alone, and implements depend upon horses, oxen, steam, or gasoline for power, the differences are quite distinguishable in most instances. The definition is here accepted that implements are operated by power greater than man's muscles, and that tools are intended to be operated principally by hand. This article deals with implements.



BRUTE POWER IS EXPENSIVE

Contrast this elephant and its two operators, scratching a quarter of an acre a day, with the power tractor in the picture on the next page, with a single operator, doing a hundred times as much work and doing it a hundred times better. The old and the new look strange side by side. *Photograph by courtesy of the International Harvester Company, Chicago.*

Agricultural tools were in use thousands of years before implements held place in agriculture. Perhaps the plow was the first farm implement, and was drawn by a camel, a horse, or an ox. It was primarily a small, crude affair, wholly of wood, or with only a point of iron, bronze, bone, or shell. Before that simple plow came into use, the tiller of the soil employed a sharp stick, a hoe, or spade, in stirring the soil. No record exists, nor can even an approximate date be assigned, of the earliest use of the animal-drawn plow in Egypt and Mesopotamia. It is generally assumed, but without much historical proof, that the earliest animal plows were in those countries. They may have been there, but some evidence exists that harnessed horses worked in France earlier than we have any evidence of their domestication in the valleys of the Nile and the Euphrates, and possibly they drew plows there in prehistoric times. But while these occurrences, if they really happened, would interest the archæologist, the proof is not sufficiently tangible to claim much attention here where a somewhat statistical discussion of the use of wood for agricultural implements has been undertaken.

American history easily goes back to a time when no plows were used in this country. The Indians were agriculturists as well as hunters, though that is not the common belief. They grew corn, and garden and field vegetables, and stored them for winter. All the Indians did not do so, but those who did not, incurred the risk of starving to death during the winter. Indians near Chillicothe, Ohio, for example, had hundreds of acres of corn in compact areas, and other Indians had cornfields in most regions where they lived; yet they had no plows. They stirred the soil with sharpened sticks with which they punched and gouged a few inches deep. Their greatest progress in the direction of farm tools consisted in the substitution of copper, shell, bone, or stone hoes; but they had no domestic animals stronger than dogs, and these mongrels were not able to pull plows and never did so.

The earliest American plows were almost wholly of wood, the same as the plows of that period in Europe. Blacksmiths made the iron points, and that was the only metal in the implement. The early moldboard—the part that was instrumental in turning the soil over—was of wood in the earliest plows, and development from that primitive pattern was slow. It took nearly a hundred years from that stage of development to reach the present model of the best two-horse plow; but a hundred years is not long when it is remembered that the plow with the

iron point and wooden moldboard was probably five thousand years in reaching that stage from the first use of a plow drawn by animals.

Plows made wholly of metal are in use, some of them not having a particle of wood in their construction. But wood is the principal material for the beams and handles of most plows, and the yearly bill of plow lumber is very large, and most of it is oak, both for handles and for beams. The development of the plow has not stopped with the practical perfection of the two-horse implement. Patterns more pretentious are constantly coming into use.

The harrow has always been associated with the plow, and apparently it goes back as far in history. Both are mentioned or pictured in very ancient records. Iron harrows were in use three thousand years ago if ancient chronicles are correctly interpreted, and wooden harrows are still in use today; so it cannot be said that metal harrows have ever superceded those of wood. Among the southern Appalachian Mountains farmers may still occasionally be seen harrowing their steep fields with a thorn bush dragged by horses or oxen. That sort of harrow was formerly not uncommon on the frontiers in forested regions. Some one of the many species of thorn (*Crataegus*) was preferred because of its profusion of tough, pliant branches which, by being dragged, pulverized and smoothed the freshly plowed soil.

"THE FOREMOST FILES OF TIME"

So far as the use of wood is concerned, perhaps the elephant in the accompanying picture has the advantage, but there is no comparison between the efficiency of the two machines. Civilization long ago turned the brute down as a working force, and harnessed science. *Photograph by courtesy of the International Harvester Company, Chicago.*

Another sort of harrow was no less simple. It was wholly of wood and was toothless. It consisted of a log about ten feet long, dragged broad-side on, across the plowed land to break the clods and level the inequalities left by the plow. It was moved forward in the same way as the roller, but it did not roll. This crude implement, like the thorn bush harrow, is not yet wholly obsolete. It is called a "drag." In rural districts it is used for smoothing roads, during the spring repairs. The same drag may see service in preparing the early fields for oats, where a smooth surface is wanted.

Harrows of wooden frames and wooden teeth were in use until comparatively recent years, and they may occasionally be seen in the tool lofts and lumber sheds of barns and granaries in central and southern states. The teeth of such harrows were naturally the portion that wore most rapidly, and the hardest woods procurable by farmers were employed as teeth. The teeth-woods varied with the region. Where yellow locust was to be had, it was always used, but hickory, hornbeam, maple, beech and even oak were employed. Wood was generally cheap, and the farmer who made the teeth for his own harrow could afford a new set every few days during harrowing time. Supplies were kept on hand and were thoroughly seasoned, ready for instant call. An English traveler in America, John Woods, writing about the year 1821, concerning a trip he had lately made through Illinois, had this to say of harrows: "They do not generally use harrows, but when they do, they are made with wooden teeth; nor have I anywhere in America seen iron-tined ones, except in the English Prairie." The place here designated was in southern Illinois.

Agricultural implements are divided into classes according to uses intended. Those in the first class prepare the soil for crops, and in this category belong plows and harrows, rollers, and fertilizer spreaders. It is, perhaps, not strictly proper to include the clearing and leveling of land, though if implements for this work are included, account should be taken of scrapers for improving the surface of uneven ground, and stump pullers for clearing ground about to pass from forest to field, and power skidders when land clearing is carried out on a large scale.

After the ground has been made ready for planting, a long line of implements is available for the work which follows. These include drills for small grains

A LITTLE WOOD STILL APPEARS IN THE HARROW

The thorn bush dragged over the plowed ground was the first harrow; the one shown in the picture is the latest; and a long gap separates the two. The earliest was wholly of wood, while the latest has little, but enough to make it efficient. *Photograph by courtesy of the International Harvester Company, Chicago.*

which once were sown broadcast by hand; planters for corn, and special machinery for planting other crops.

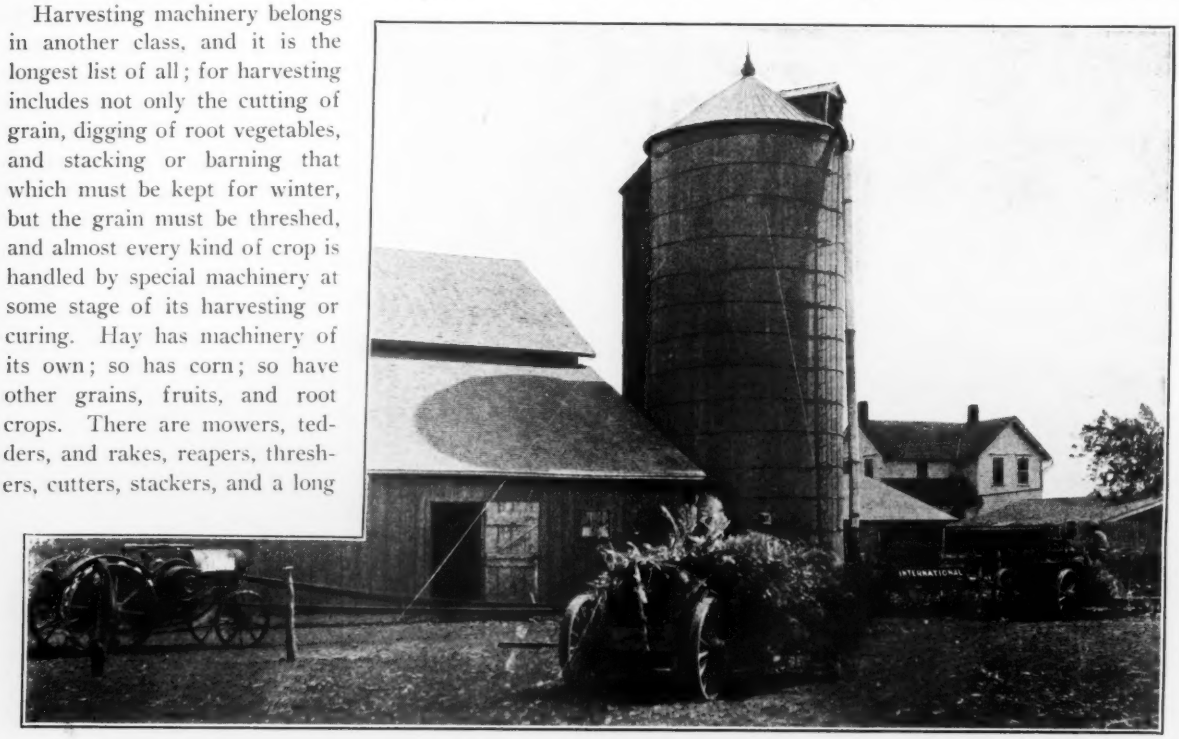
Cultivators constitute another class. They do the work between the planting and the harvesting. Corn, cotton, cane, and other crops, including vegetables, that are planted in rows, call for cultivators, and the kinds are many. Nearly every sort of crop has been provided with a series of cultivators fitted to its particular needs.

Harvesting machinery belongs in another class, and it is the longest list of all; for harvesting includes not only the cutting of grain, digging of root vegetables, and stacking or barning that which must be kept for winter, but the grain must be threshed, and almost every kind of crop is handled by special machinery at some stage of its harvesting or curing. Hay has machinery of its own; so has corn; so have other grains, fruits, and root crops. There are mowers, tedders, and rakes, reapers, threshers, cutters, stackers, and a long line of others. Lists would be tedious because of their length; at the same time, they show how great has been the inventive genius of Americans in providing scores of excellent implements to do the work on farms where a few simple tools sufficed not many years ago.

The simple tool had about reached the limit of its possibilities; and agriculture would have remained stationary had not improved appliances been invented. The wheat crops of today could not be harvested with the sickles, cradles, and rakes that were in use in 1830, even if the plows and harrows of that time could have prepared the land and planted the crops. If the wheat of the present time, after being harvested, depended upon the threshing facilities of 1830, most of the grain would be lost, because it could not be handled. The "groundhog" threshing machine of that day would be as incapable of saving the present wheat crop, as the prairie schooners of the same period would be incapable of carrying the grain to market.

Farm machinery and transportation facilities improved and increased side by side. America's commerce and population were growing and the demand came for better facilities than had been known in the past.

It is not necessary to detract from the importance of steel in the phenomenal expansion of agriculture; but wood's place has been no less indispensable, and perhaps it has even gone ahead of steel in some essential particulars. The forests have done a work at least equal to that done by the mines; but the importance of wood is not confined to the past. It continues without any



FILLING THE FARM SILO

Everything here is up to date. The wooden silo is the most pretentious thing in view, and the tractor, wagon and silage cutter are doing the work of converting the green corn into approved provinder for the following winter. Silos by thousands are built yearly, and every silo calls for the latest machines. *Photograph by the International Harvester Company, Chicago.*

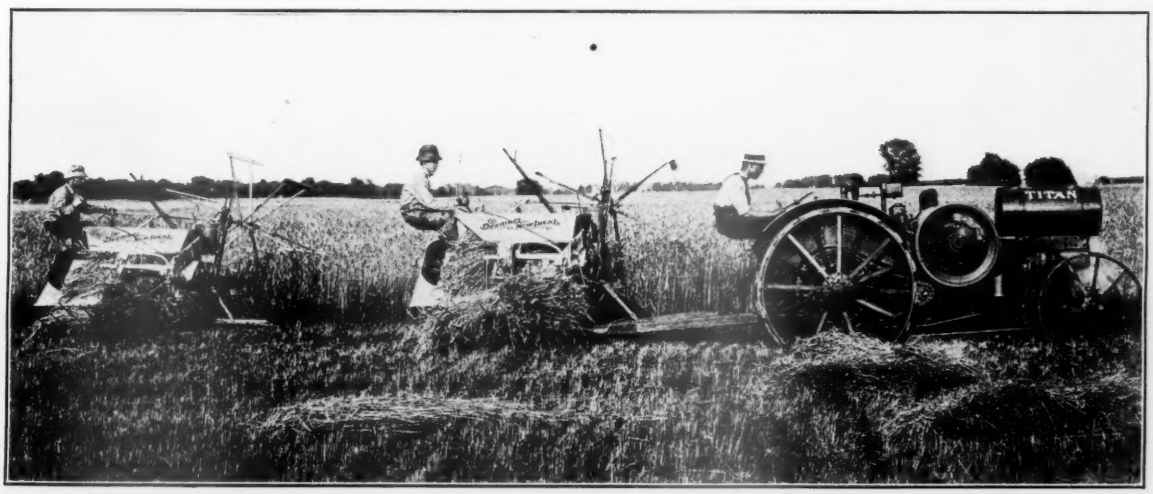
THE CALIFORNIA COMBINED HARVESTER

At one end of the harvesting evolution stands the sickle, and at the other end is the combined machine which cuts and threshes all at one operation. Between the sickle and the harvester intervenes practically the whole span of human history. Gasoline tractors are now taking the place of the horses. *Photograph by H. H. Alexander, Fresno, California.*

indication that it will ever lose first place in the manufacture of agricultural implements. A hundred years ago most farm tools were of wood. Metal constituted such parts only as could not be made of wood. It is not known how much wood and how much iron were used in the United States a century ago in the manufacture of farm tools, but late statistics show the present demand for wood for implements, and it exceeds 320,000,000 feet a year, and if the wood which goes into hand tools for the farm were added the total would probably exceed 400,000,000 feet. In the list which follows, the forest's contribution to this great industry is shown according to kinds of wood and the quantity which each kind furnishes yearly.

Kind of Wood	*Feet Annually*
Yellow pine	98,543,396
Oak	69,346,130
Maple	48,319,210
Cottonwood	15,143,000
Yellow poplar	12,412,300
Red gum	11,976,000
Ash	10,677,400
Hickory	9,860,470
White pine	8,243,440
Basswood	7,861,750
Elm	7,249,000
Beech	4,968,490
Birch	4,704,000
Cypress	2,682,000
Spruce	2,623,500
Douglas fir	2,537,250
Hemlock	1,257,400
Tupelo	1,140,000
Chestnut	884,000
Sycamore	290,000
Western yellow pine	219,000
Redwood	200,500
Larch	100,000
Sugar pine	50,000
Butternut	10,000
Eucalyptus	10,000
Black walnut	8,000
Hornbeam	1,200
Cucumber	1,100
Mahogany	500
Cherry	300
Total	321,319,336

No important wood that grows in the United States is missing from the foregoing list. Both softwoods and hardwoods are represented, but the latter appears in nearly double the quantity of the former. The employ-

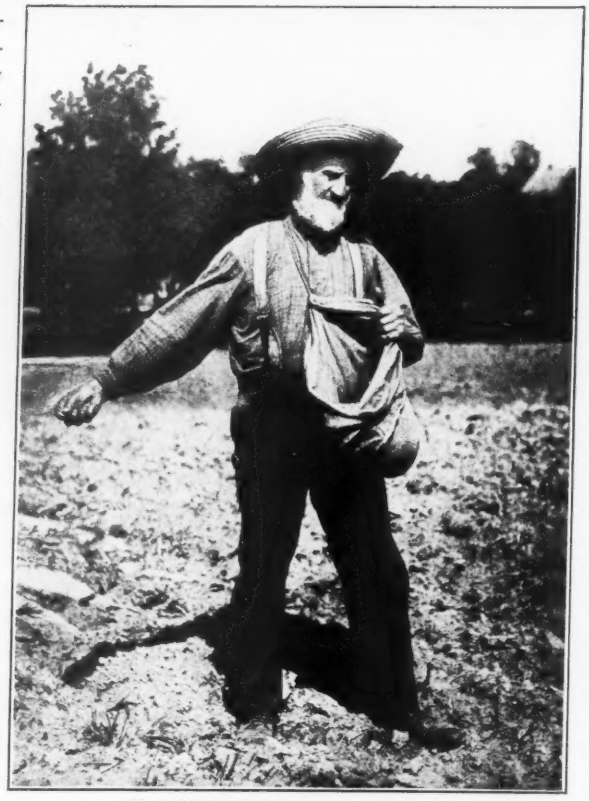


REAPERS DRAWN BY TRACTOR

The reaper was developed as a machine to be drawn by horses, but it did not stop there. The next step was to dispense with the horses and substitute engines, which could work faster and at less expense. The principal parts of the modern reaper are still made of wood. *Photograph by the International Harvester Company, Chicago.*

ment of wood in the manufacture of agricultural implements is not controlled by chance. Every use is backed by reason.

Implements drawn by horses are equipped with poles or shafts and these are nearly always of wood. This material has first place because it furnishes the necessary strength without being too heavy; because it is elastic and will yield without jolts and jerks, and such would occur if shafts and poles were of metal. It is necessary, however, if the best results are to be secured, that the wood for shafts and poles be carefully chosen. All woods are not suitable and relatively few are wholly satisfactory. Some lack the necessary resiliency, some are weak and brittle, some are not tough enough to stand the strain. Hickory and ash are more used than any others; but birch, elm, oak and maple are satisfactory for many kinds of poles, and in some instances the strong yellow pines are acceptable. Most of the shafts which are steamed and bent are hickory or ash.



"A SOWER WENT FORTH TO SOW"

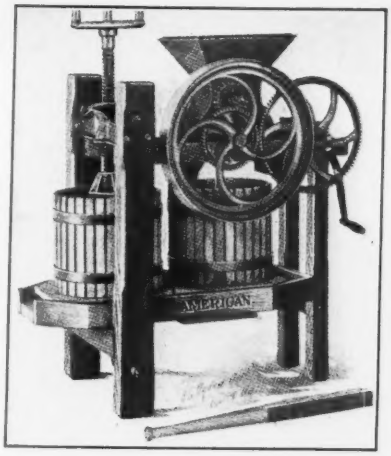
He continued to go forth in exactly the same way for several thousand years until a better way was discovered, and the better way is illustrated in the accompanying picture shown below. The teaching here is by contrast—the old and the new side by side. *Photograph by courtesy of the International Harvester Company, Chicago.*

Many agricultural implements are equipped with hoppers, chutes, elevators, and conveyors. Most of these belong to machines for threshing, cleaning, sorting, or grinding grain. Platforms provide standing room for the operators. These appliances do not require tough woods, but in some instances hard and strong kinds are wanted. Elasticity is not essential, for strains are not usually great, or jolts severe or sudden on hoppers and conveyors. But woods are desired which will take a smooth finish and that are light in weight. Such qualities are found in most of the pines, in hemlock, redwood, cottonwood, basswood, tupelo, red gum, cypress, and yellow poplar. Boxes, com-

SOWING GRAIN IN THE NEW WAY

The machine does better work and a great deal more of it than was possible in the old time when a man threw the grain from his hand, hit or miss, just so it fell somewhere in the field, which it did not always do. Machines distribute it with mathematical accuracy. *Photograph by courtesy of the International Harvester Company, Chicago.*

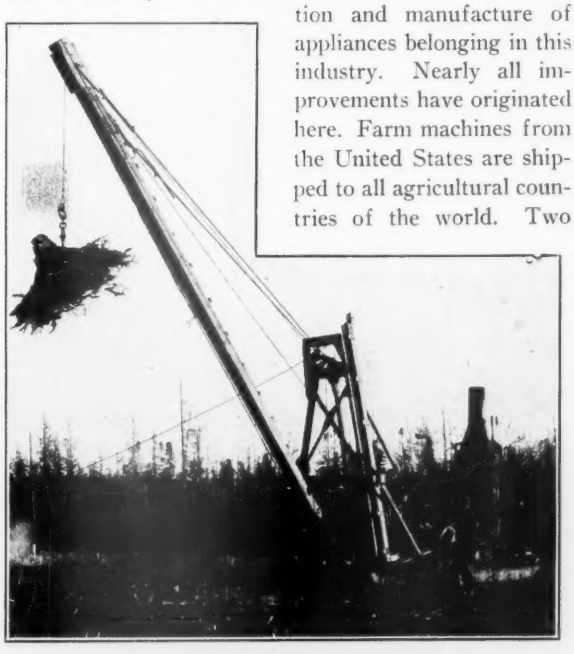
partments, and drawers are essential parts of many machines in the barn or granary, and the woods of which these are made do not differ from those for hoppers and chutes.



HOW THE APPLE CROP IS SAVED

The clumsy, wasteful and uncleanly method of making cider which was the only way known on the farm a few generations ago has been relegated to the past by a machine which grinds and presses the fruit with little waste of time or waste of apples. Such presses are now found on most farms which have orchards of bearing apple trees.

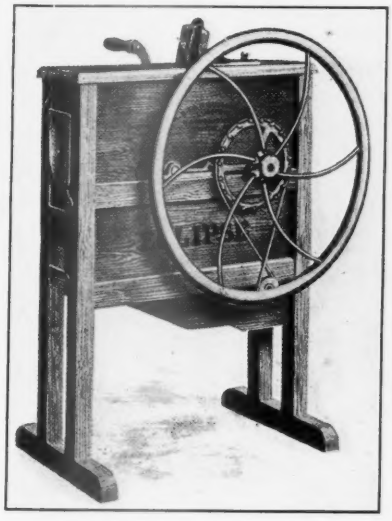
In a study of the evolution of farm tools and machines, and their stage of manufacture at the present time, two outstanding features claim attention. The first is, the extreme slowness with which improvements were made in early times compared with the rapidity with which invention has followed invention during the past century. The other remarkable fact is that wood has always held and still holds a prominent place in such manufacture. Inventions have not lessened the demand for wood, but have augmented it. An increase in the use of iron has occurred also, but it has not been more rapid than has been the growth in the demand for wood in the agricultural implement industry. America has led the world in the invention and manufacture of appliances belonging in this industry. Nearly all improvements have originated here. Farm machines from the United States are shipped to all agricultural countries of the world. Two causes have been chiefly responsilbe for the growth of the industry in this country, namely, cheap land and dear labor. This is equivalent to opportunity and necessity, or to a reason why it should be done, and the means of doing it.



CLEARING LAND BY MACHINERY

Strictly speaking, the stump puller may not be a farm implement, but few implements are more essential in a new country. The old way of clearing land with ax and mattock is too slow, and powerful machines are brought into use to put more speed into the operations. Clearing cut-over land is a large business now.

Up to one hundred years ago—in fact as late as 1845—America with all its fertile land, did not raise enough wheat to feed its own people. The cost of doing it was too high. Hand labor prevailed almost exclusively, and a large number of farmers was necessary to grow and care for the crops. Though a much larger proportion of the people lived on farms than at the present time, only four and a third bushels of wheat per capita were produced in the United States in 1845. Forty-five years later, with relatively fewer persons on the farms, the production of wheat was ten bushels per capita.



HANDPOWER CORN SHELLER

This is not the largest or most powerful shelling machine in use, but it is found on nearly all farms where corn is grown. The sheller is of wood, generally of maple and oak, except that the throat and jaws are of steel, in the part of the machine where the strain is severest.

In 1830 the work of one man for three hours was required to grow and harvest a bushel of wheat. Sixty years later, a fraction of that labor sufficed to produce the bushel. Again, machinery must have the credit, and the efficiency of such machinery is so well understood that American farmers now spend one hundred million dollars a year for machinery. Wages are much higher than they were seventy-five years ago, yet most farm products are cheaper. It is because one man with suitable machines can produce more than a much larger number of men, working in the old way, could produce eight or ten decades ago. It is claimed that one man with machines can raise as much rice in Louisiana as four hundred men with hand tools can raise in India.

The need of inventions was felt before the inventions came, otherwise, they would not have come. Yet it seems strange that the need was not felt and that results did not follow, hundreds of years earlier. Nearly two thousand years ago a reaper, foreshadowing the present one, was invented in France, but was forgotten. A century ago most wheat fields contained less than five acres each. That was true particularly when the farmer depended upon his own and his family's labor. Wheat must be harvested within a few days after it is ripe, or it falls and is lost. Four or five acres were as many as the average farmer could reap with a sickle. If he grew

a large acreage, part of it spoiled before he could harvest it, and there was no incentive to grow larger crops.

A farmer so situated was not interested in threshing machines. He could pound out his small crop with flails, or tread it out with horses during the winter when he had little else to do. Consequently, no inventor was encouraged to make a threshing machine, and there was none worth the name till later years.

A PALESTINE THRESHING FLOOR

Exactly as used in David's time, 3,000 years ago, a flat rock, near the supposed site of Ornan's floor. Scripture commands that oxen tramping out the grain shall not be muzzled, but these are. We learn here by contrast. Compare this crude method with that shown in an accompanying picture where a machine is doing the work. *Photograph by courtesy of the International Harvester Company, Chicago.*

The invention of the reaper opened the door to nearly everything else in the agricultural implement line, for one thing led to another. It happened that railroads began to be built the time the reaper was invented, and this provided means for carrying wheat to market, and farmers in remote localities, if near railroads, were encouraged to grow wheat. Before that time, grain went to market in wagons and could not go far, or it went by boats on rivers, and navigable streams were remote from many regions suitable for wheat growing. The reaper and the railroad solved the wheat problem, and the necessity for farm machinery led to inventions for planting and harvesting the crops.

Wheat has been here spoken of in some detail, not because it was the only farm crop, but because it stands in a measure for all. Its history is much like the history of other farm crops which began to increase rapidly about the same time. The invention of serviceable farm

THRESHING MACHINE AT WORK

Fifty yoke of oxen, as shown in the accompanying picture, could not tramp out as much grain as this one machine, and the machine's work is better and more sanitary. A man can scarcely sew the sacks of grain as fast as they are filled. Man is the only animal at work here. *Photograph by courtesy of the International Harvester Company, Chicago.*

machinery solved the labor problem, made farming profitable, and opened the way for the utilization of the abundance of cheap lands.

It would be interesting to follow in detail the development of farming due to the invention of machines, but it is not necessary to do so. The remarkable results are well known. The farmer once did well to plow an acre a day, and now the largest power plows will do a hundred acres a day. The farmer once harvested half an acre a day with a sickle. The combined harvester now does a hundred times as much. Similar improvements are found along the whole line of farming. Implements are responsible for the change, and it is interesting to note wood's part in the great agricultural implement industry. It is safe to affirm that the development of this industry could never have occurred in the treeless regions of Mesopotamia, Argentina, or China, though the land, the people, and the necessity are there. The lack of suitable woods for machines would have hindered invention and discouraged manufacture, though iron might have been abundant. Conditions and resources were just right in the United States, with the result that we have outstripped all the rest of the world in the invention and manufacture of agricultural implements.

THREE IMPORTANT MACHINES

This picture shows three important machines—a mower, a windrower and a loader—and some of the best wood in America appears in their construction. They have replaced the scythe, hand rake and pitchfork, and have done it within the past century. *Photograph by courtesy of the International Harvester Company, Chicago.*

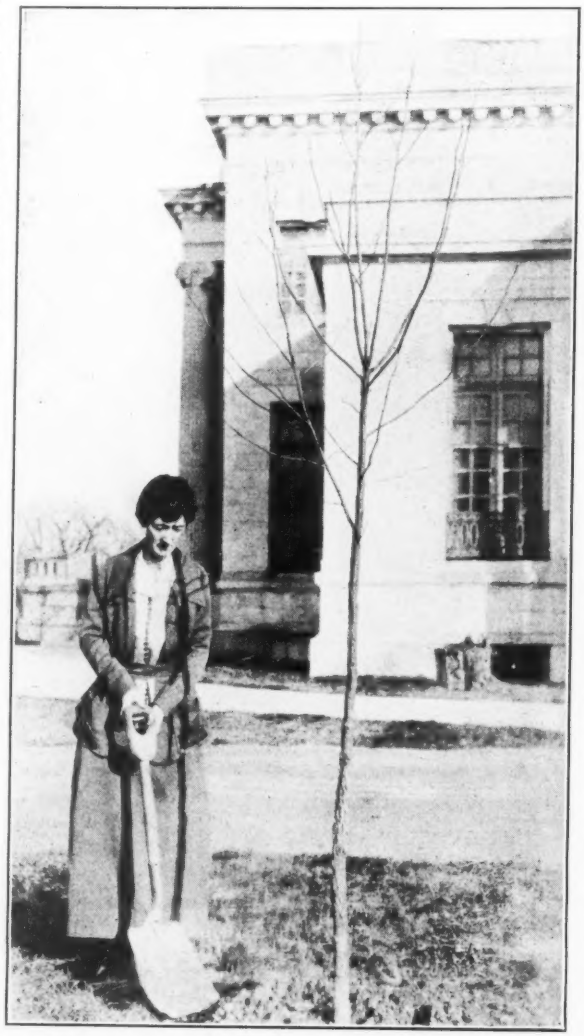
More farm machines are destroyed by rust and rot than by wear and work. With protection and care, implements should serve twenty years, with only an occasional replacement of those parts subject to excessive wear. Instead of twenty years, the average life of a binder is twelve years, and of drills, seeders, and rakes ten years. In many instances such a machine is ready for the scrap pile in four or five years; but it is due to no fault or failure of the machine. Lack of protection against rain and sun is responsible. The machine is often left exposed to weather for days or weeks while not in service, and the metal parts become pitted with rust and the wood is attacked by decay. After that happens, a little time is all that is needed to complete the destruction. On some farms the aggregation of machines in the barnyard or elsewhere looks like an accumulation of junk. That is unprofitable farming and is on a par with the habit of leaving horses, cattle, and sheep without shelter in winter. When machines are thus neglected, it becomes an even race between the wooden parts and the metal to determine which will be ruined first.

Too many farmers take poor care of machinery even when they do the best they know, because they understand few of the principles on which machines are built. They do not know how to keep the correlated parts in order or properly adjusted. That condition is slowly passing, however; largely because agricultural colleges are giving instruction in the care and operation of machines, and the conditions on farms are improving. Implements are giving better and longer service, and profitable use is leading to greater use.

When farmers have a better understanding of the good points of machines, manufacturers will make better machines. The tendency is to furnish the best that farmers will buy and use. It has always been the rule that manufacturers have given more thought to the making of implements than farmers to using them.

AMERICAN LEGION PLANS MEMORIAL TREE PLANTING

NOW come Arbor Days again. So general has become the response to the call of the American Forestry Association for the planting of memorial trees that these Arbor Days have now become memorial days. Trees are being planted not only for him who gave his life to his country, but in honor of him who answered his country's call. This form of memorial appeals particularly to the officers of the American Legion and inquiries about selecting and planting trees are coming to the American Forestry Association from every state. Memorial trees are to be used as the setting for the memorial building or memorial group adopted in many places. The "Roads of Remembrance" idea of the Association fits in with the tree planting suggestions and the placing of what ever form of memorial may be adopted. Hugh W. Robertson, assistant to the Commander of the Department of New York State, has placed the plans for tree planting before the committee on memorials for that state. Thomas Goldengay, the State Adjutant for New Jersey, has placed the matter before the posts in that state. Russell G. Creviston, writes from the national headquarters at Indianapolis that he will put the suggestions before the state adjutants throughout the country. La Vere R. Collier, of the Idaho Department, has forwarded post lists to the Association so the commanders may get the information direct. From this enthusiasm it seems that the soldiers themselves will do some of the memorial tree planting. They saw as perhaps no one else could see, the value of forests and good roads in France. The result of this co-operation will be a more widespread interest in trees and an awakening to their value.



AN ARBOR DAY PLANTING

This tree, planted by the daughter of a Governor, has been entered in the "Who's Who" of famous trees now being compiled by the American Forestry Association at Washington. Miss Gertrude Black, daughter of the Governor of Kentucky, is shown planting this tree near the Governor's mansion at Frankfort, Kentucky, as part of the Arbor Day exercises throughout the State. The schools of Kentucky, particularly at Louisville, are making a great record in tree planting.

The attention being given to memorial trees by the schools of the country is well shown in the memorial tree planting by the Arsenal Technical High Schools of Indianapolis. This school is only seven years old but has enrolled nearly 3,000 students. It is situated on the site of an old United States Arsenal and the army buildings as Guard House, Barracks, Artillery Building, and Arsenal lend themselves readily for use as school rooms. It is the hope of the school to make the campus, consisting of 76 acres, a nature park in which are found every species of plant indigenous to the State of Indiana. The school sent 232 boys and one girl to the front. It did honor to these patriotic students on Armistice Day by planting and dedicating a tree to each one in a part set aside as "Liberty Grove."

This park was dedicated with appropriate exercises by the members of the January senior class, Milo H. Stuart, principal of the high school, presiding. The two hundred and thirty-third tree was planted with ceremonies by Walter Shirley, president of the senior class, and decorated with the national colors by Mary Cain, vice-president of the class.

"Liberty Grove" was formally dedicated by Mr. James H. Lowry, secretary of the Park Commission of Indianapolis. The oration of the day was delivered by Dr. Orien F. Fifer, pastor of the Central Avenue Methodist Church. The program closed with the singing of *America*. The trees for "Liberty Grove were donated by the Board of Park Commissioners of Indianapolis, and are of every variety typical of America. A group of the seniors has taken it upon themselves to see that the grove is preserved and to personally see that any trees which may die are replaced. The names have all been registered on the national honor roll being compiled by the American Forestry Association.

Women's clubs are finding in memorial tree planting a most fitting way for honoring a town's heroes. At Columbia, Pennsylvania, the organization of which Miss

Lillian S. Evans was the chairman, planted trees near the Lincoln Highway. The exercises were opened with the singing of the *Star-Spangled Banner* and then prayer by Rev. G. F. Hayes. General Shannon, or "Two-Yard" Shannon, the hero and idol of the Iron Division, spoke, and Reginald Wright Kauffman made the address. In this talk Mr. Kauffman expressed his views of the tree as a memorial. He said:

"Just before the war started, I was lunching in New York with a friend of mine, a poet. Our talk turned on a volume of his poems that was soon to be published, and among these poems was 'Trees.' That poet's name was Joyce Kilmer. When America entered the World War, he volunteered for service and, arrived in France, he always asked for the most dangerous work. A few months since, I came upon his grave in the American Military Cemetery at Seringes —where there was no tree, no green thing at all—and close beside it the graves of two of the boys we are remembering today: Leo Bittner and Cyrus Mathiot. For the soldier dead I think that you could have chosen no more fitting memorial than a living tree. Mankind has always regarded the tree as friendly and often as divine. There was the mystic oak of the Druids; the sacred Bo-tree of Buddah; the ash Yggdrasil of Norse Mythology, whose roots were in the underworld, but whose arms reached to the Asa-gods above the skies. How large a part the tree has played in our own Holy Writ, from the Tree of the Knowledge of Good and Evil in Genesis to that Tree upon which the Divine Sacrifice was consummated, I need not, surely, remind you."

IS YOUR TOWN READY FOR ARBOR DAY?

WITH the coming of Arbor Day there comes a renewed interest in memorial tree planting. The American Forestry Magazine wants all tree plantings reported to it at Washington. The Arbor Days this Spring follow:

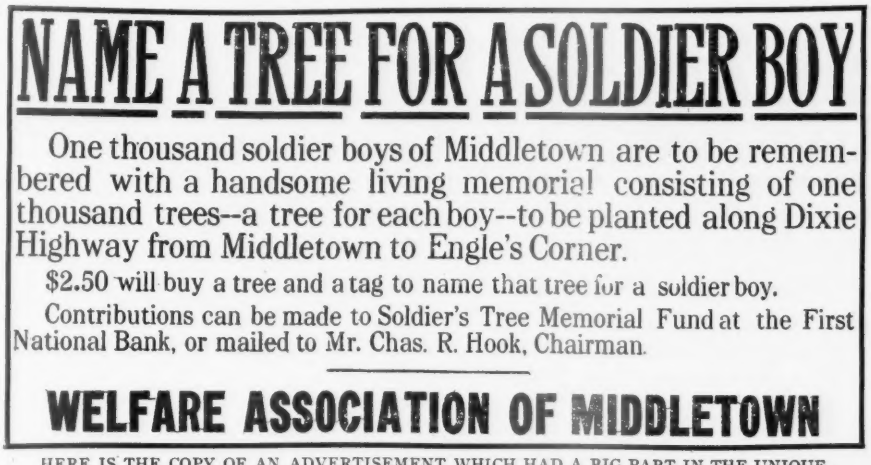
Colorado—Third Friday in April.
Connecticut—May, on proclamation by the Governor.
Idaho—April, on dates set by the County School Superintendents.
Illinois—On proclamation by the Governor.
Indiana—Third Friday in April.
Iowa—Proclamation by the Governor.
Kansas—On proclamation by the Governor.
Maine—On proclamation by the Governor.
Maryland—Second Friday in April.
Massachusetts—Last Saturday in April.
Michigan—Last Friday in April.
Minnesota—Latter part of April, on proclamation of the Governor.
Missouri—First Friday after the first Tuesday in April.
Montana—Second Tuesday in May.
Nebraska—April 22, birthday of J. Sterling Morton.
Nevada—On proclamation of the Governor.
New Hampshire—At option of the Governor.
New Jersey—Second Friday in April.
New York—First Friday following May 1.
North Dakota—Option of the Governor.
Ohio—Middle of April, on proclamation of the Governor.
Oregon—Second Friday in April.
Pennsylvania—On proclamation of the Governor.
Rhode Island—Second Friday in May.
South Dakota—Latter part of April, on proclamation of the Governor.
Utah—April 15.
Vermont—First Friday in May.
Virginia—On proclamation of the Governor.
West Virginia—Second Friday in April.
Wisconsin—First Friday in May.
Washington (State)—First Friday in May.
Wyoming—First Friday in May.

Arbor Day, Mr. Pack points out, started in Nebraska when the State Board of Agriculture on January 4, 1872, heard the resolution of J. Sterling Morton that April 10, 1872, be consecrated to tree planting. This was adopted, but later, in honor of the father of Arbor Day, the date in Nebraska was changed to April 22 in honor of Mr. Morton's birthday.

In "Roads of Remembrance" municipalities see opportunities not alone for an inspiring memorial, but for the promotion of better feeling with other municipalities. In this campaign, wherever taken up, the American Forestry Association finds that rivalry of the most healthy kind develops between organizations such as chambers of commerce and boards of trade, rotary clubs and like forces for civic betterment. At Tampa, Florida, is found, perhaps, a good sample of the get-together and do-spirit. There the Rotary Club put over a campaign for $7,500 for a "Road of Remembrance." There was no great fuss about it. The thing was just done because the club knows a good thing. The following outline from E. D. Lambright, of the Memorial Highway Committee of the Rotary Club, tells of the plans:

"Hillsborough County is now building many miles of asphalt road. One of these roads extends from the city limits of Tampa to the country line of Pinellas County, and is probably the most traveled of any county highway, as it leads to the resorts and growing towns of the West Coast. Suggested by James Yeates, chairman of the Hillsborough County Commissioners, himself a Rotarian, the Rotary Club espoused a plan to make this road a 'Road of Remembrance.' For fifteen miles, from city limits to county line, it is to be bordered with the laurel oak, more familiarly known as the 'water oak.' Between the oaks will be set out oleanders and various colored flowers. The road will be beautifully parked on both sides and, when the trees reach a sizeable growth, will undoubtedly be one of the most beautiful driveways in the country.

"The campaign for funds to buy and plant the trees was conducted and $7,500 was raised for this purpose. Prospective subscribers were informed that they could buy any number of trees, to represent them on this highway, at $2.50 a tree. Relatives and friends of the boys who gave their lives in the war were thus given the privilege of suitably


NAME A TREE FOR A SOLDIER BOY
One thousand soldier boys of Middletown are to be remembered with a handsome living memorial consisting of one thousand trees--a tree for each boy--to be planted along Dixie Highway from Middletown to Engle's Corner.
$2.50 will buy a tree and a tag to name that tree for a soldier boy.
Contributions can be made to Soldier's Tree Memorial Fund at the First National Bank, or mailed to Mr. Chas. R. Hook, Chairman.
WELFARE ASSOCIATION OF MIDDLETOWN

HERE IS THE COPY OF AN ADVERTISEMENT WHICH HAD A BIG PART IN THE UNIQUE CAMPAIGN FOR A "ROAD OF REMEMBRANCE" AT MIDDLETOWN, OHIO

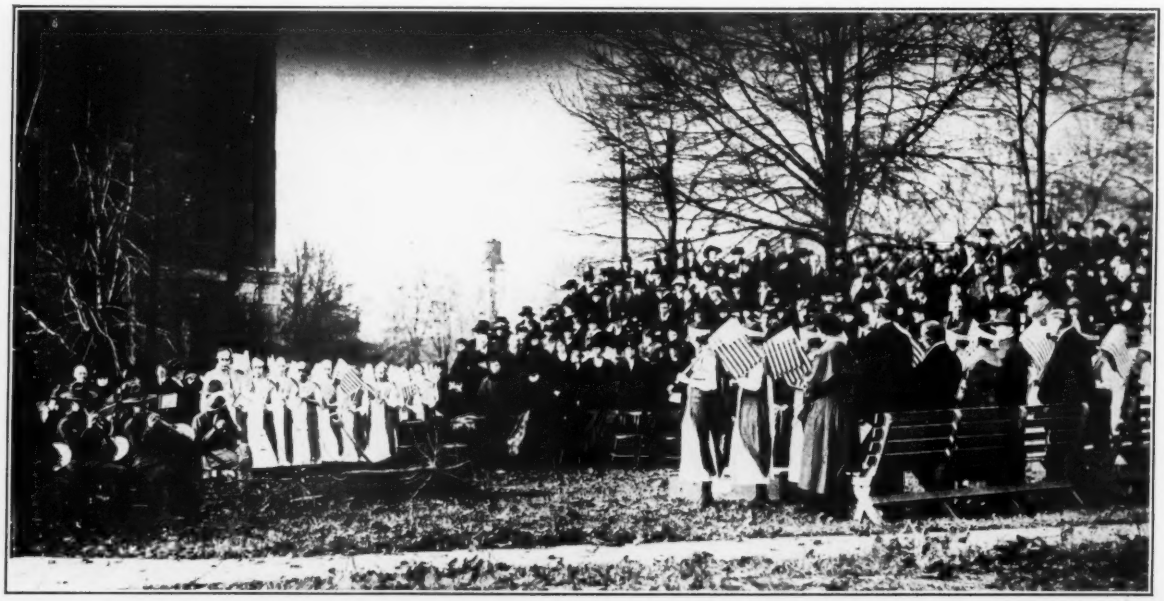
and perpetually expressing their acknowledgment of the 'supreme sacrifice.' The trees are to be fully protected during their early growth and will have the constant attention of experts. At the city limit line, where the memorial highway begins, the city is to erect a permanent and imposing arch, and the County Commissioners are to erect another at the county line, where the 'Road of Remembrance' ends, these arches to bear the names of the heroes they commemorate. The idea has proved very popular and it is assured that Pinellas County will do likewise, joining the Hillsborough Highway with one for its own young men, making at least a thirty-mile continuous stretch."

The keynote is in the last line of the statement which says that it is assured that Pinellas County will do the same. There we have the possibilities for a magnificent system of roads throughout the country when something is started for of course the next county will not lag in this great work. Thousands of dollars have been voted for good roads. This money is to be spent within the next few years. To no country, except France and Belgium, does there come such an opportunity to beautify while building. It is an opportunity that must not be missed. And it will not be if the answer to the call sent out by the American Forestry Association continues to grow in volume. At Middletown, Ohio, a unique campaign for memorial tree planting has been conducted. Mrs. Charles R. Hook, wife of a vice-president of the American Rolling Mill Company, helped in a campaign by the Welfare Association. Half page advertisements were inserted in the newspapers and in quick time a fund for a thousand trees was raised and these will be planted along the Dixie Highway from Engle's Corner to Twelfth Street, in Middletown. Mrs. John B. Hamme has completed plans for the memorial

PLANT A TREE

By DAVID H. WRIGHT

If when I am gone
Thou would'st honor me
Then plant a tree.
Some highway, bleak and bare,
Make green with leaves.
So radiant and fair
And full of leaves my monument will be,
So ever full of tuneful melody.
My monument will be
A sight most rare—
Trees planted everywhere.
A highway broad from city to the sea—
Plant this in memory of me.



CEREMONY AT THE MEMORIAL TREE PLANTING OF THE ARS ENAL TECHNICAL HIGH SCHOOL AT INDIANAPOLIS, INDIANA

tree planting along the Lincoln Highway, twelve miles each side of York, Pennsylvania. Mrs. D. P. Montague and Miss Mollie E. C. Montague have completed plans for tree planting along the Dixie Highway out of Chattanooga. At Brooklyn, New York, plans have been put forward for a memorial highway as part of a great civic plan that will mean the making over of much of the great city. Anna T. Graham, Home Service Secretary of the Red Cross at Milton, Florida, reports the planting of twenty memorial trees and in the dedication the Federation of Women's Clubs will take part. At Appleton, Wisconsin, the High School has planted six memorial trees, under the direction of Paul G. W. Keller, the principal.

These are but a few of the varied organizations that have turned to memorial tree planting. Has your town a plan? Is there an opportunity for a memorial highway or a memorial park? What about a "Road of Remembrance" to the next town? Make tree planting by the citizens a part of any memorial plans. Give your memorial the proper setting of memorial trees. Give the citizens something to do besides pay the bill. Let him have a part in the work and the result will be better citizenship and he and his children will hold to that community just as does the tree they plant.

THE ADOPTED SON OF THE TWENTIETH ENGINEERS (FOREST)

IT is not generally known that our now famous regiment of forest engineers adopted one of the fatherless children of France, but this is a fact and his photograph is here shown. He was from a gypsy family, says the Rev. Howard Y. Williams, Chaplain of the Regiment, in reporting the matter to the American Forestry Association, and had never been in a home up to the time he was adopted. He had never walked up-stairs, and was really frightened by the first experience. Now he is well clothed and cared for, going to school every day and twice a week to church to learn the catechism. Both his schoolmaster and the local priest give very favorable reports of his progress. The following letter from Miss Marie Faguet, daughter of the Supreme Court Judge of the Department, is interesting. Miss Faguet is looking after the orphans and fatherless children in her father's Department, being a representative of the Society for Fatherless French Children. Anyone interested in the two other cases she mentions may correspond directly with her at 14 Rue de la Grandiere, Tours, France, as she reads and writes English, or with the editor of this magazine.

Tours, France, December 3, 1919.

My dear Chaplain:

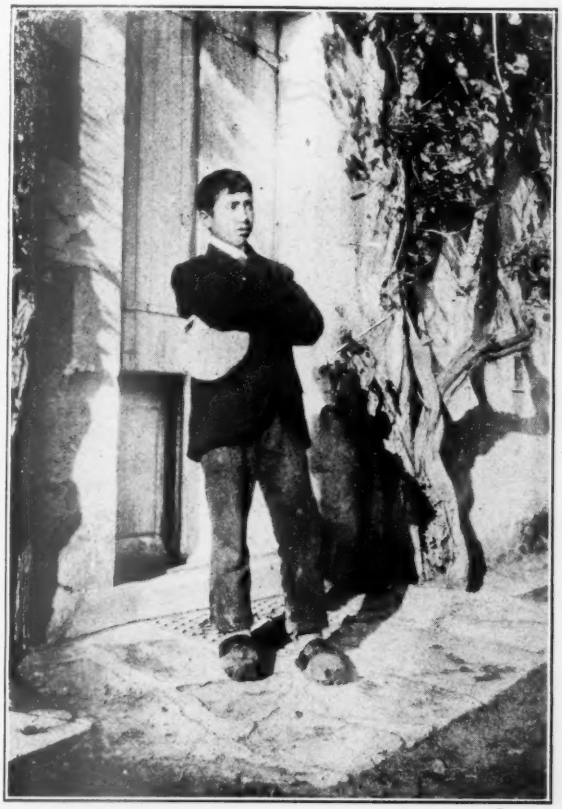
Some days before my departure from the country to Tours, I took the picture of Jean Doer, which I send you in this letter so you can know this little boy, to whom you are so good and so kind. I regret very much that you had not met Jean before your departure to America. Very often I speak about you to Jean, who would be so glad to know you. Will you come soon to France? Every day Jean Doer goes to school, and twice a week to church to learn the catechism. The schoolmaster and the priest say to me that Jean is a very wise and intelligent boy.

Always I take care of the young orphans of Argy. Many are adopted by the Americans. But there are two who are very poor; a little girl of two years old, Emiliene Gihault, and a boy of six, whose name is Ernest Deloleuf. Do you know some American people who would like to adopt these two children? The mothers are working very hard and they are very honest families.

My sister and brothers join me in kindest remembrance.

MARIE FAGUET.

By adoption, Miss Faguet does not mean legal adoption, but simply the willingness to take an interest in the child



JEAN DOER—THE ADOPTED SON OF THE TWENTIETH ENGINEERS (FORESTRY)

through yearly subscription and such letters as one may desire to write. Fifty dollars a year is all that is needed for a child like either one of these two, who is living at home with the mother, and the subscription may be for one year or longer.

THE POPLARS

Now with the breath of coming rain
The poplars sway in troubled row,
Like old wives, rocking to and fro
In pain;
They shake their heads in shocked surprise
And whisper underneath their breath,
Like mourners in a house of death;
Then lift their aprons to their eyes
Again.

—Nellie Burget Miller.

MUNICIPAL FORESTRY IN NEW YORK

BY JOHN BENTLEY, JR.

PROFESSOR OF FOREST ENGINEERING, CORNELL UNIVERSITY

THE practice of forestry by municipalities abroad is not uncommon, and no doubt many travelers are familiar with the "town forests" of Europe. One of the best known of these is the communal forest belonging to the city of Zurich, in Switzerland, which has an area of 2,840 acres, yielding on the average an annual income of nearly $20,000, or about $7.00 per acre; and this is the more remarkable because most of this income is derived from the sale of firewood, which is perhaps the cheapest product of a forest. This tract of forest land has been under management since the year 1309, and it has been steadily increasing in value during these six centuries. In this country the number of towns and cities that are practicing forestry is still small, and their efforts have been confined chiefly to the protection of watersheds from which the city's water supply is drawn. The state of New York passed a law in 1912 making it possible for counties, towns and villages to acquire, by purchase, lease, gift, or condemnation, lands having treegrowth or forests thereon, or lands which are suitable for the growth of trees; and while this law may have encouraged the practice of forestry to some extent, it is a matter of regret that more of the non-agricultural land in the state is not put to use in this way. The advantages to be obtained are numerous, besides the income to be derived from the sale of forest products there are the benefits of regulation of stream-flow, protection of the watershed, shelter from winds and storms, protection to birds and game, and a healthful resort for the people of the town and community.

A FINE INDIVIDUAL SPECIMEN

Scotch Pine planted 10 years ago, and now 15 feet high. In the last two years this tree has grown 40 inches.

Sherburne, a village in Chenango County, New York, has been planting trees systematically since 1912, and the work was begun without the knowledge that state laws were being enacted which might make tree-planting something of an inducement. It therefore deserves all the more credit for its interest in forestry. To Dr. Homer G. Newton, for many years a resident of that village, is due the honor of having initiated the policy of tree-planting and watershed protection, for he it was who gave the village a tract of land surrounding its reservoirs and bordering the stream for some distance above them, and he it was who foresaw the necessity of having these lands forested, if the water supply of the village was to be conserved and protected to the best advantage. Accordingly, the terms under which the village came into possession of this watershed provide for the removal of all buildings, and the planting of ten thousand trees each year for five years (or until 1917), and four thousand trees annually, thereafter, until the entire area of ninety-five acres is forested. If openings occur where the planted trees fail to establish a stand, such spots are to be replanted, and the work is to be continued until the whole tract is covered with a thrifty growth of forest trees. In its conception and in its execution the plan is an admirable one; and the wisdom of it bears testimony to the thoughtful generosity of the man who is responsible for it. Moreover, as time goes by and the trees grow into a dense forest, the Reservoir Park, as the tract is to be known, will stand as a perpetual memorial to its donor, a memorial of practical value and natural beauty which can be appreciated and enjoyed by every resident of the town. It is earnestly hoped that this example will be followed, and that many other towns in New York and other states will establish and maintain municipal forests.

Chenango County is a region of great natural beauty; the hills and valleys combine to make one of those picturesque counties for which central New York is famous. Mad Brook, a small stream rising a few miles to the northeast of Sherburne, meanders through open fields and drains a watershed of more than a thousand acres; it supplies two reservoirs located about a mile from the town. On the banks of the stream is a growth of willows, and the moist lands bordering the stream are being planted to ash, spruce, and other trees which find the conditions favorable. Above the stream, the country slopes up to a hill on which is a body of mature timber, a remnant of the vast forest which originally covered the hills of Chenango County. In these forests, pine, hemlock, maple, beech, ash and birch reached large sizes, and contributed greatly to the natural resources of the country. But few of the pieces of woodland now remaining give any idea of the original magnificence of these forests; agriculture and stock-raising have demanded open, cultivated fields; and the forests were largely cut down. In some parts of the surrounding country, however, agriculture has been attended with so little success that a second growth of timber is rapidly taking possession of the ground, and the proportion of woodland is actually increasing. Wherever tree-growth occurs on this watershed it is, of course, being protected and encouraged, and the open spots that occur will eventually be filled up by planting appropriate species of trees, if they have not already succeeded in establishing themselves by natural seeding.

SCOTCH PINE PLANTED IN 1910

Mr. R. P. Kutschbach, of Sherburne, N. Y., who is in charge of the plantations, is standing beside the trees, which average 12 feet in height, some of the more vigorous ones reaching 15 feet.

AT THE EDGE OF A WHITE PINE PLANTATION

These trees have been planted 10 years, and average about 9 feet in height. The growth during the last two years has been especially good, and the tallest trees will reach a height of 12 feet.

The hillsides about the resorvoir abound with springs which, of course, would flow more copiously and with greater regularity if the slope were fully protected by a cover of forest trees; and since water conservation is the main object in view, one of the most important functions of the Reservoir Park is to safeguard these springs, which help to keep the reservoirs filled.

The varied topography and exposures give rise to quite a wide range of soil conditions, especially as regards moisture; this affords an opportunity to employ several species of trees for the work of reforestation, chief among which are white pine, red or Norway pine, Scotch pine, Norway spruce, white ash, cottonwood and red oak. All of these species have been tried, and observations have been made to determine their relative merits under the existing conditions. Owing to the fact that some of the earlier plantations of white pine have been attacked and damaged by the white pine weevil, red, or Norway pine and Scotch pine, which are not subject to the attack of this insect, have been substituted for white pine during the last few years. The white pine weevil is an insect that attacks the growing shoot of the tree, causing its death. The effect is to force one of the lateral branches of the tree to become the leader, and although the tree itself rarely dies, it is always forked or crooked, as a result of the insect's work. Red oak was tried in 1915 on the drier hill tops, but has not given the satisfaction that was expected. Hemlock, one of the most abundant of the trees in the original forests, is found reproducing exceedingly well and is reclaiming considerable territory along the edge of the woods, and although this species is slow in growth, it will be left where it occurs naturally, because it is so well adapted to the conditions.

NORWAY SPRUCE PLANTED BETWEEN ROWS OF WHITE PINE

While making fairly good growth during the last two seasons, the spruce has taken many years to become established. The quality of the soil here is better adapted to pine.

The tree planting has been done with mattocks, the men working in crews of two. In this method of work,

one man digs a hole, and his companion follows, setting the trees, a supply of which he carries in a bucket. The trees are spaced at regular intervals of six feet along straight lines which are themselves located six feet apart. This makes a total of 1,210 trees per acre. The spacing in the plantation is kept as regular as possible to facilitate the present work of planting, as well as to make counting and future management easier. A considerable portion of the area has already been planted, and at the present rate of planting the watershed will be covered with trees about the year 1922. From that time on, it will be necessary to fill up any fail spaces, should they occur, and to practice some system of silviculture which will best subserve the purpose for which the park was established.

Although located some two or three miles from a railroad the danger from fire is not to be underestimated; the popularity of camp fire suppers, and the carelessness of smokers have been responsible for many a fire which has damaged or destroyed forests generally considered outside the danger zone. Every precaution will be taken in the case of this plantation to avoid damage by fire. This will be accomplished by establishing fire-lines along those portions of the park which are most exposed, and by frequent patrol and inspection during dry and dangerous seasons. A set of fire-fighting tools will be kept where they can be gotten quickly, in case of an emergency. More effective than anything else, perhaps, will be the education of the people to a sense of their own responsibility in protecting a park which is maintained for the public benefit. When the people in a community come to regard a forest park of this kind in the same light that they regard their own personal property, there will be little trouble in securing effective fire protection.

To many people, the question of costs is the most important of all considerations. If the project can be shown to pay returns on the money invested, it will appeal to everybody concerned as sound business. It has been shown in a number of cases that forest plantations will yield very satisfactory financial returns under fair conditions* The conditions under which the planting has been done at Sherburne make the prospects for ultimate financial success very good; unless some unforeseen accidents occur, a profit of from 4 to 6 per cent may be expected at the end of forty or fifty years at which time the plantations should contain a large proportion of merchantable trees. Up to 1915 the average cost of planting, including stock, transportation, labor, and inspection, had been $9.71 per thousand trees, or $11.75 per acre. The work in the last four years has approximated $13 per acre. This is a very reasonable figure considering the conditions existing at the Park.

The development of this project should be followed with much interest by towns or villages that contemplate similar plantations or forests.‡

FINANCIAL STATEMENT OF THE AMERICAN FORESTRY ASSOCIATION FOR 1919

EXPENSES

Publication of Magazine	$26,230.11
Membership Solicitation	7,905.92
Business Office Expenses, General Supplies, Equipment and Salaries	22,457.66
Meetings	681.19
	$57,274.88
	$57,274.88

INCOME

Membership and Circulation	$42,110.60
Advertising Income	7,555.90
Books Sold	270.18
Paper Sold	53.22
Fire Loss Adjustment	5,734.90
	$55,724.80
Operating Loss	1,550.08
	$57,274.88

ASSETS

Cash	$ 7,120.33
Investments	26,314.33
Accounts Receivable	1,257.58
Inventories	207.00
Deferred Assets	1,770.00
	$36,669.24

LIABILITIES

Association Bond Outstanding	$ 10.00
Accounts Payable	6,954.43
Notes Payable	5,000.00
Surplus January 1, 1919, plus net profit of $299.79	24.704.81
	$36,669.24

Funds donated to American Forestry Association for Educational and Scientific Work in 1919 and not included in above Financial Statement $103,934.00

Expended as follows:

Forestry Publicity and Propaganda	$ 5,600.00
Foresters Edition (American Forestry)	1,000.00
Printing and Distribution of Bulletins and Pamphlets	3,995.00
Educational and scientific work through the Conservation Department affiliated with the National War Garden Commission from January 1, 1919, to completion of this work on June 1, 1919	93,239.00
	$103,934.00

During 1917 the American Forestry Association received gifts for educational and scientific work through the Conservation Department, amounting to	$ 56,700.00
During 1918, for same uses	228,500.00
During 1919, to June 1, when this war-time work ceased	93,239.00
	$378,439.00

This total sum was expended through the Conservation Department affiliated with the National War Garden Commission, and is a part of the "war-time," patriotic service of the American Forestry Association.

WEASELS AND THEIR HABITS

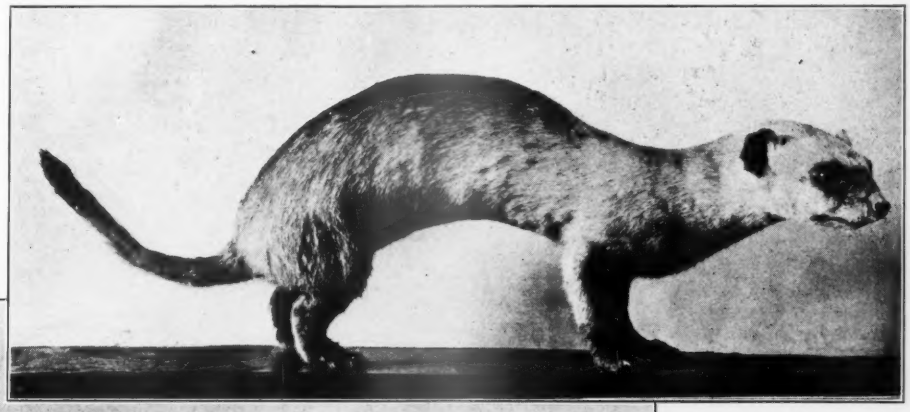
BY DR. R. W. SHUFELDT, C. M. Z. S.

NOTWITHSTANDING the fact that there are many species of weasels, their habits are quite similar. The principal differences are due to climate, to the character of the country in which they live, and to food. The habits of the black-footed ferret (Fig. 1), the largest of all the American weasels, are different from those of the least weasel (Fig. 3)—the smallest of the type. The smaller weasels are decidedly more slender, with longish, cylindrical bodies and snake-like aspect, the animals themselves being extremely active and muscular, while the larger species are more robust and rather less active.

All the weasels, and there are upwards of forty species of them, are distinctly carnivorous; and so far as the writer is aware, it is not known that they ever touch anything else, as berries, or any herb or vegetable growth. All of the smaller weasels live principally upon mice, and these they are able to follow straight down into their holes. Through such places they squirm in and out with as much ease as the mice themselves, the latter being thoroughly terrorized when it becomes known to them that there is a weasel in the neighborhood. In the northern regions the larger species prey chiefly on rabbits and lemmings, and on some birds of a corresponding size, while further south the big, long-tailed weasel subsists largely on chipmunks, gophers, and other rodents of equal size.

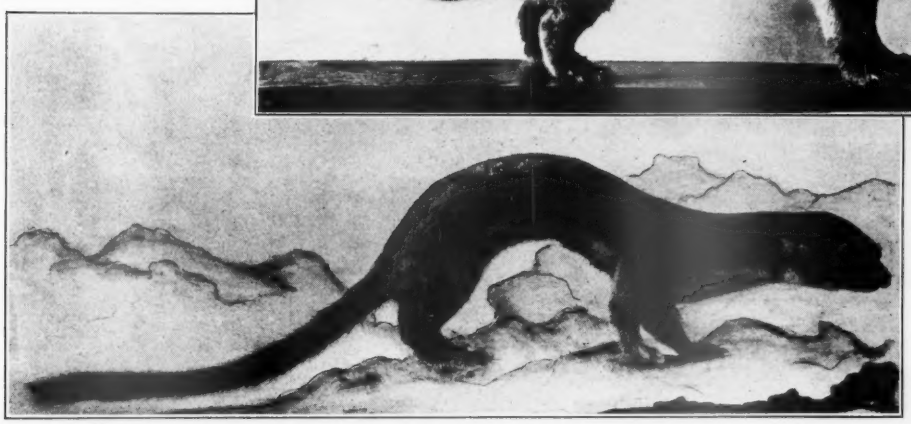
No mammal in the entire world, great or small, can compare with the weasels as hunters. They hunt their prey incessantly, following it by scent, and take the lives of a far larger number of victims than they need for food. They kill, and keep on killing, just for the fun of it; and it is only during the cold winter weather, when game becomes scarce, that they conceal for future consumption the bodies of some of the animals they have slain.

When deer mice and other small animals are abundant, a weasel makes great havoc among them, killing one after another, merely to suck a part of the fresh blood, and then abandoning the bodies for some other animal to pick up and devour. On several occasions the writer has seen weasels chasing deer mice on the snow; and as one of the latter is by no means a poor leaper, almost as good as the weasel itself, such a chase becomes quite interesting. It is extremely rare for the mouse to make good its escape; for, even should it reach an old stone wall or other place of refuge, the bloodthirsty hunter follows directly after it, squirming his way through crevices and chinks, and among stones, with surprising ease and rapidity, until at last one hears from within the dismal squeals of the captured mouse, announcing the result of the run. The writer once shot a New York weasel (Fig. 10) in the very act of capturing a mole, and the stench that the former was guilty of was something dreadful; in its way it was almost as bad as what a skunk accomplishes under similar circumstances. When hungry, and intending to



ONE OF THE RAREST AS WELL AS ONE OF THE LARGEST WEASELS KNOWN IS THE BLACK-FOOTED FERRET (*Putorius nigripes*).

Fig. 1. This specimen is in the exhibition series of the United States National Museum. It is a large animal, and its general coat is of a pale clay color, except the tip of its tail and its feet, which are black. It possesses all the habits of its kind, and is doubtless a perfect terror to the small mammals of the regions it inhabits.



THERE ARE QUITE A NUMBER OF SPECIES OF WEASELS ON THE PACIFIC COAST, AND THIS FORM IS ONE OF THEM

Fig. 2. This long-tailed, long and slender species is known as the Washington Weasel, being an inhabitant of that State (*Putorius washingtoni*). It is also in the National Museum exhibition series.

eat the mouse it has taken, the weasel will first suck all the blood it can from the body of its victim through the jugular veins at the neck. It will then bite through and lift the vault of the skull, and get away with the brains, of which it seems very fond. Next it pulls back the pelt from the fore parts towards the tail, eating as it goes, until nothing remains but the reversed hide, to which dangle the four feet and tail. Sometimes weasels

IN THIS CUT WE HAVE ONE OF THE SMALLEST SPECIES OF WEASELS KNOWN (*P. rizosus*); ITS TOTAL LENGTH BEING ABOUT 12 CENTIMETERS.

Fig. 3. This interesting little animal has a range from Hudson's Bay to Alaska and from Northern Minnesota to Montana. It is a light fawn color above and white beneath.

capture shrews in wet places, and no end of meadow mice in the old corn fields and pasture lands. As for rats and common mice, the writer has known a pair of weasels to rid a big barn of them in less than one week. During their stay one or the other of them would frequently be seen in broad daylight; they evinced no fear whatever of one's presence, especially after they fully appreciated the fact that they would not be molested.

In killing gray or other rabbits, larger weasels run them down, jump upon their backs, and inflict the death wound by a bite just back of the ear. Sometimes hunters or others have witnessed these tragedies, and have taken the rabbit for their share—the weasel being in some cases lucky to get off with its life. While the chase is on the rabbit will often give up, and, squatting down, commence to squeal in the most pitiful manner, until its merciless hunter takes its life. Of course, were the rabbit not so terrified—its heart nearly bursting with fear for its life—it could easily escape, for no weasel living could overtake a rabbit on a stern chase run. Occasionally when a weasel meets a rabbit in the woods, the latter will run as fast as he can into some adjoining field or open space, and thus escape his enemy, who rarely follows him under such conditions, although there are exceptions to this. And then, could the rabbit but realize it, it is just possible that if it put forth the strength of which it is capable, it could readily tear such an insignificant creature as a weasel into bits. Even a big rat will sometimes stand off a weasel successfully, especially when defending its young.

Well known instances have occurred where a large hawk or owl has seized a weasel in its talons, and suddenly, while soaring off with its captive, realized its mistake too late. The weasel, squirming about, at last fastens his teeth in the body of his captor, and, cutting some big vein, soon deprives him of his life, both coming down together—the hawk or owl quite dead, while the weasel often runs off with only a few scratches, and none the worse for his trip aloft.

It is said that in England the weasels sometimes hunt in little packs consisting of a dozen or more; and that there are well authenticated cases of their having resented the interference of man, promptly attacking the latter, and absolutely placing him in danger of his life. One can easily imagine how they might do this; eight or ten agile weasels would be very hard to keep at bay, particularly as they, by instinct, make at once for the veins of the neck; for them to run up a man's clothing would be

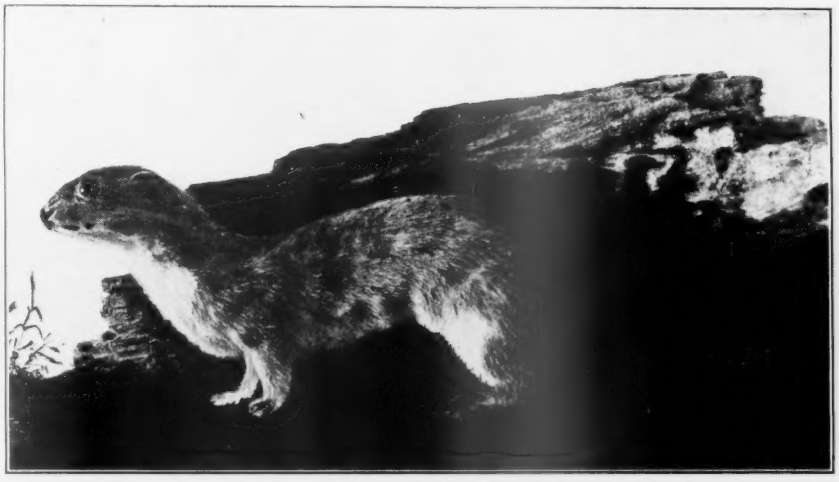
THE OLD PIERCE'S MILL, PIERCE'S MILL ROAD, WASHINGTON, D. C.

Fig. 4. Not so many years ago, and to some extent still, many of the small mammals of this region—weasels among them—occurred in the woods close to this historic old building. (See figure 6.)

no trick at all. Their teeth are like lancets; they are extremely persistent in any attack they undertake, and a simultaneous one of this character would undoubtedly give them additional courage.

During the summer weasels will also feed upon crickets, grasshoppers, insects of various kinds, and every bird's egg they can reach, together with the birds, both big and little. Quails, meadow larks, and ground-building birds of every kind, constantly fall victims to these little blood-sucking hunters. It has been said that a weasel is so agile that it can sometimes capture a bird after the latter has taken flight (Fig. 10); this it does by quickly springing into the air after it with a bound. The strength and agility of these animals is really something wonderful, and there is no end to their fight and pluck. When cornered they will squeal most shrilly; but this is more in defiance than fright. The writer has known one to get into his henhouse and murder a dozen hens upon the

roost at night. The weasel was content to take only a bite or so from each head and suck all the blood he could, escaping down a rathole, and being smart enough not to come out again while the writer was there with the lantern. But after all, the service these little rascals render about the barns and outbuildings, in the way of destroying scores upon scores of rats and mice, far more than compensates for the loss of a few hens. In short, we may believe with Benjamin Scott that "if considerations of profit and loss are to determine, according to modern tendencies, the fate or the survival of our smaller wild birds and quadrupeds, we cannot too strongly inculcate the doctrine that nothing is really gained by destroying the balance of nature; while the extinction even of an animal so apparently insignificant as a weasel would be a loss, not to be repaired by any supposed utilitarian advantage to those who, in reverent pursuit of natural science 'love to view these things with curious eyes, and moralize.'"



OTHER SMALL WEASELS, OTHER THAN OUR LEAST WEASEL (Fig. 3), OCCUR IN OUR WESTERN TERRITORIES, AND THIS IS ONE OF THEM

Fig. 5. This one has received the name of Puget Sound Weasel (*P. streatori*), and it is to be met with along the coasts of Oregon and Washington.

The writer has several times caught the New York weasel in a box trap, and it is remarkable to see how gentle they are when taken captive; they do not seem to know what fear is. Witmer Stone once caught a female specimen of the same species in this way, and said that "within less than an hour from the time she was first removed from the trap to her cage, she would take meat from my hand without the slightest hesitation, and never offered to bite my fingers even when touching them with her nose. This tameness could not have been brought about by hunger, for when I found her in the box trap she had not wholly eaten the rabbit's head which I had used for bait."

A weasel's nest is generally made up of old, dried leaves or grass, and rendered warm, dry, and comfortable. It is usually placed in the hollow root of some dead tree, or in a hole in a bank somewhere. At other times they select the burrows of other animals, as chipmunks, rabbits, and gophers, frequently killing and devouring the rightful owner prior to occupancy.

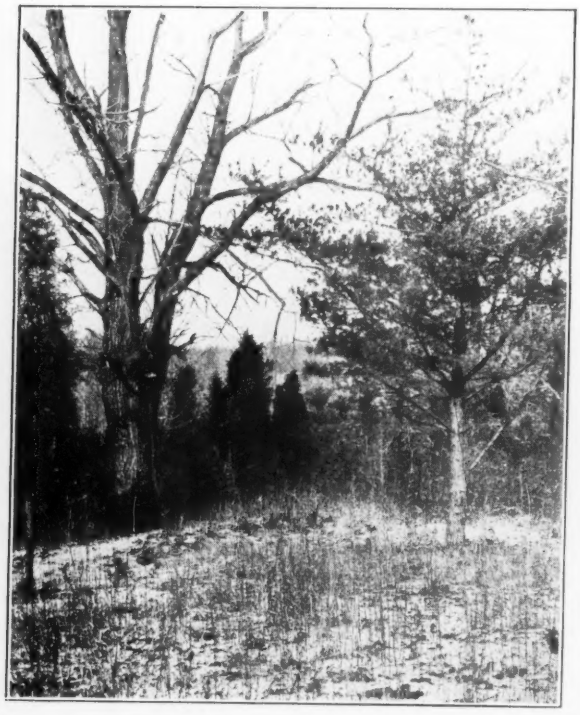
Weasels are very prolific, in some regions having two or three litters a year, and from three to five weaselets to the litter. Females, which in some of the species are considerably smaller than the males, are fearless to a fault when called upon to defend their young. Regardless of the size of the assailant, she will at once fly at him, be it man, dog, or feathered foe, and she is quite ready to sacrifice her own life in defense of her precious young. From all we can gather, it would appear that the period of gestation in any of the weasels is between six and seven weeks. In the Southern States they breed earlier than in the North. Along the southern border of the United States the young may be produced as early as the latter part of March; we may count a month later for the middle districts, while those in the far north are not produced until well into the month of May. When unencumbered by the cares of a family, weasels become great travelers, and will, even in the space of one night, wander several miles. This they will continue to do for a month or more.

The New York weasel, like others of its kind in the northern geographical ranges, assumes a pure white coat on the approach of winter, the tip of the tail alone remaining perfectly black, as it does throughout the year. In the summer the upper part of its coat and the feet are of a deep chocolate brown. To a moderate extent this encroaches on the lower part, the latter being white, faintly shaded with pale yellow. In winter this pale yellow may become persistent on the lower parts of the animal, but not invariably so. As spring approaches, the weasels, in shedding their coat, present a mottled or pied appearance; and in some of the southern districts the change from the pure white to the summer coat is said to be never quite complete, as it always is with typical northern forms. Usually it is the end of the tail that remains black, and this is strikingly conspicuous when the remainder of the coat is white. It is rendered still more so as the animal passes over the snow. Under these conditions the black tip may be of service to a weasel, for it is this which, above everything else, rivets the gaze of the beholder. One sees the black pencil of a tail only, as the white and hard-to-be-seen creature flees over the fresh snow. Doubtless this likewise holds true for the enemies of the weasel among the owls and hawks and others.

Were a hawk, for instance, to pounce upon one of these little fellows, he would naturally attempt to seize with his talons the part most evident to his sight—that which held it and influenced the effort to capture. A

miss would often be the result and the fleeing weasel would escape.

There are those who believe that the black tip to the weasels tail in the summer coat also has its advantages, and these redound to the young; for by its aid they can follow their mother better as she rapidly passes through the mixed undergrowth of the weasel's haunts, especially



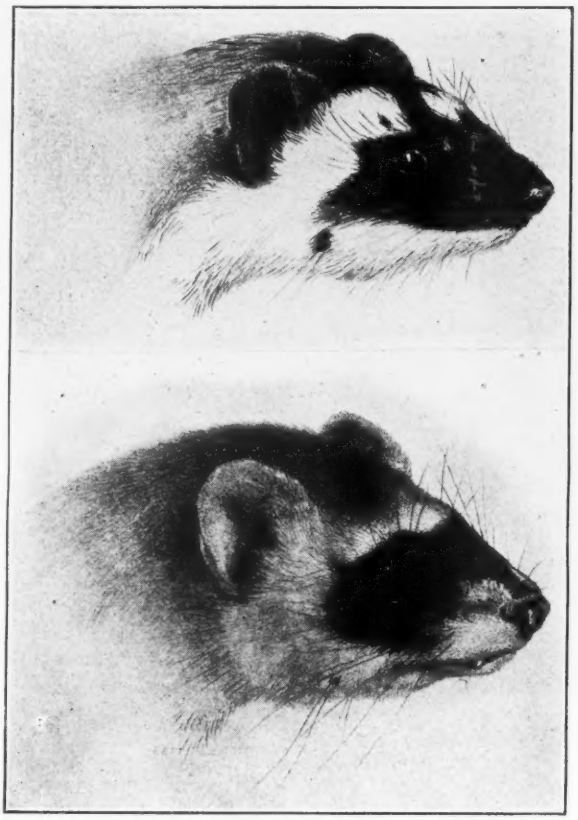
SUCH SCENES AS WE HAVE HERE STILL EXIST CLOSE TO THE NATIONAL CAPITAL.

Fig. 6. To meet with fresh weasel tracks on this snow should not surprise one, for the section is plenty wild enough for them, and there is no end of their food to be met with in such localities.

where it is composed of a great variety of plants, brambles, grasses, and the like, under which conditions a black spot to constantly fix the attention would, in this case be of great assistance.

When seen on any surface, as snow or soft mud, the footprints of a weasel are characteristic and easily recognized. It progresses by bounding leaps, clearing intervals to suit its purpose and convenience. In landing, the hind feet come nearly squarely into the tracks made by the front pair. Thus we have the little impressions it makes in pairs, side by side, and rather close together, each track being produced by the imprint of the fore foot pressed down by the hind foot following it on the same side. The ordinary leap of the animal rarely exceeds a foot and a half; but if badly frightened it can clear ten or a dozen feet at a bound, landing with great certainty in the very spot it desires to reach.

There is another notable fact about weasels rarely described by naturalists and not generally known; here is an instance of it. On one occasion the writer was in his barn on a bright, sunny morning, when a fine male New York weasel ran across the floor. He ran up on some barrels of grain, and out on a heavy oak crossbeam, in front of one of the horse stalls. Being close to him, he had no means whatever of escaping beyond jumping over the writer's head, or, in the other direction, onto the horse. Having the threshing-end of a heavy oak flail in one hand, the writer, partly in fun, partly in earnest, with careless aim struck a blow at him. The blow was a miss, and the end of the flail hit the beam a fraction of an inch below where he had quietly stood. He disappeared like a puff of smoke. During subsequent years and in substantiation of later observations, the writer learned that this was quite a trick or the weasel's. Others have noticed it, as for example Stone and Cram, who say in their "American Animals" that, "though bold and fearless, they have the power of vanishing instantly, and the slightest alarm sends them to cover. I have seen one standing within reach of my hand in the sunshine on the exposed root of a tree, and while I was staring



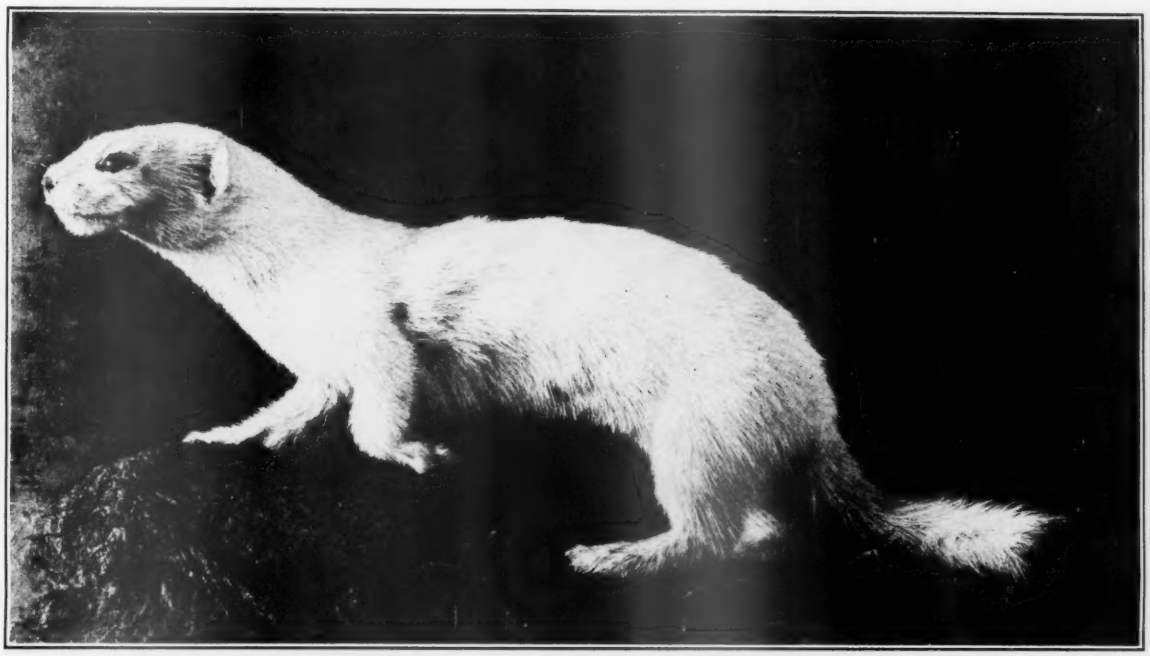
UPPER HEAD, THE BRIDLED WEASEL; THE LOWER ONE IS THE BLACK-FOOTED FERRET

Fig. 7. These are typical members of the weasel group in this country, and were originally drawn by Mr. Ernest Thompson Seton. Pugnacity and ferocity is seen in every feature of either of these heads.

at it, it vanished like the flame of a candle blown out, without leaving me the slightest clue as to the direction it had taken. All the weasels I have ever seen, either in the woods or open meadows, disappeared in a similar manner."

Just how well off the American museums are today for specimens of the black-footed ferret, I am not pre-

pared to state; but I do know that some thirty years ago there were only a very few of them in the collections. This large weasel spends not a small part of its time during the day in the burrows of various animals—more particularly those of the prairie dog or prairie marmot, an animal upon which it frequently preys. This species is said to closely resemble the polecat of Siberia. The two differ in only a few not very important characters, our form having somewhat longer ears, shorter and coarser fur, added to some differences in its skeleton. It is at once recognized by the transverse black band across the face, encircling the eyes, and by its black feet, which color is carried somewhat above, or at least up to the wrist and ankles. We know but little of its life history, and contributions to the subject would be of value. The



A FINE MOUNTED SPECIMEN OF RICHARDSON'S WEASEL IN THE EXHIBITION SERIES OF THE UNITED STATES NATIONAL MUSEUM (*P. c. richardsoni*) AS IT APPEARS IN ITS WINTER COAT

Fig. 8. Richardson's weasel has a black-tipped tail in winter, as almost all weasels possess in their winter pelage.

big prairie dog towns in the southern part of Wyoming and northern Colorado are good localities in which to hunt for specimens. In general coloration the animal is yellowish brown above, white beneath, tinged with yellow, the colors shading into each other on the sides and rump. The nose, sides of head, ears, throat, lower surface of neck, belly, and under side of tail, all white; about two inches of the distal end of the tail are black.

Another interesting weasel is the long-tailed weasel—a large species with an uncommonly long tail (Fig. 9). This animal is of a pale yellowish brown above, being darker upon the head. Its upper lip and chin are pure white, the end of its tail black, feet yellowish buff. It turns white in winter, as do other weasels. In northern Montana and along the upper Missouri this species is found inhabiting the burrows of the kit foxes, the gophers, and the badgers. This is a desert region; but where the animal is found in the mountains—as among the Wahsatch—it is seen to be a tree climber, where it is apparently as much at home as a pine marten. These weasels are capable of giving off a very powerful and fætid stench; but they are nevertheless captured and devoured by some of the larger species of hawks, and even fed by the latter to their young. It is quite an abundant species in some localities, and by no means as retiring as the black-footed weasel.

Our bridled weasel of southern Texas is another large and very handsome species with a long tail. Most of its head is black, with elegant white markings (Fig. 7), shading into dark chestnut brown on top. This is continued in a rich shade over the upper part of the body, the chin and throat being whitish. It is a yellowish orange beneath, and the tail has merely a black tip. It is believed that this form does not turn white in the winter; and, while it has many of the habits of its congeners, we still stand in need of a full account of its life history.

We have another very interesting member of this group in Bonaparte's weasel, with its two subspecies, Richardson's and the Juneau weasel. These forms are also known as ermines and stoats. The ermine or stoat of Europe is known to science as *M. erminea*, and for a number of generations it has been known to many observers, as well as to naturalists, furriers, and others. It is of great value economically, as its pelt forms one of the staple products of the fur trade, and could, in Europe at one time, only be worn by members of the royal families. This law held especially in Russia, where ermine tails were principally used for such purposes.

In summer, Bonaparte's weasel is of a dark brown color above, the under parts and upper lip being of a yellowish white. One that the writer saw caught in a box trap was in winter pelage, and one of the most beautiful little creatures imaginable—more attractive than beautiful perhaps, in the sense we would use the latter word when describing a mammal with a pelage exhibiting some bright color.

A considerable amount of discussion has appeared in various works devoted to the life histories of mammals in regard to the mode of change of the color of the hair of the coats of those animals that exhibit summer coloration, and then, with more or less suddenness, don one of white, or nearly white, for the winter season. Weasels that do this have come in for their full share of the various opinions held by zoologists. Some believe that one of these animals, in changing to the white pelage of winter, sheds the fur, the coat of white being entirely new. Others have contended that owing to a certain falling of temperature at the beginning of winter, the coat of the weasel simply turns white, the hair not being shed at all; while still others affirm that it is due in part to this, and in part to the old coat being, to some extent, replaced by the winter one or *vice versa*. In other words, there are in general two ways in which the change may take place. Those who have studied the question most closely contend that the change may or may not be coincident with the shedding of the coat. Such an opinion is based upon the fact that, in examining a large series of specimens, examples have been met with where-in the white hairs have been found to be tipped with brown, with a dark brown stripe of new hair down the back, being a part of the incoming spring coat. Autumnal specimens show the former condition and vernal ones the latter. Temperature markedly affects it, and to a large extent is the controlling agent. This is supported by the fact that the northern species only assume the complete white coat in winter, while the extreme southern forms never exhibit any such change. Species ranging in the intermediate regions are often piebald, and remain so until the shed gives them a new coat of the summer season—that is, the bi-colored one. Under ordinary circumstances, the change from the white coat to the summer pelage takes about three weeks; but this may be retarded or hastened by the conditions of the temperature in the early spring months.

SOME WEASELS ARE TRULY BEAUTIFUL IN THEIR WINTER COATS—DOCUMENTARY EVIDENCE HEREWITH. (Photograph by the author of the Long-tailed Weasel, No. 102089 in the United States National Museum. Somewhat reduced.)

Fig. 9. On account of its long tail, science has named this species *Putorius longicauda*, and it has a range over the great Plains from Kansas northward.

The change is of marked service to the animal. The white coat largely protects the weasel against its enemies, while it serves to render it inconspicuous and difficult to be seen by its prey. The colors also equalize the temperature of the animal's body. A great authority and close observer of the phenomenon states that "it is too well known to require more than an allusion that, although the darker colors absorb heat to a greater degree than lighter ones— so that dark-colored clothing is much warmer than light-colored when the wearer is exposed to the sun's rays—the radiation of heat is also never greater from dark than from light-colored surfaces, and consequently the animal heat *from within* is more completely retained by a white than by a dark covering. Therefore,

the temperature of an animal having white fur would continue more equable than that of one clothed in darker colors, although the latter would enjoy a greater degree of warmth while exposed to the sun's influence. Thus the mere presence of a degree of cold, sufficient to prove hurtful if not fatal to the animal, is itself the immediate cause of such a change in its condition as shall at once negative its injurious influence."

Our ermines are prolific breeders, and may bring forth as many as six or seven at a birth; in the extreme north this may take place even before the female has assumed the summer coat. She usually selects for her home any convenient excavation in the ground, or among the rocks, or cavities in the trunks of trees. The breeding season depends to some extent upon the latitude, being later in the far north than in the more southern parts of the range of the species. The female specimens of the ermine are markedly smaller than the males, although they possess all the characteristics of the species, including the presence of the anal glands and the power to make themselves offensive through their use.

SO AGILE ARE OUR WEASELS THAT THEY ARE ENABLED TO CAPTURE SMALL BIRDS ON THE WING

Fig. 10. This spirited scene is one of frequent occurrence in the northeastern part of the country. The birds are common snowbirds (*Junco*), and the voracious little weasel is in full winter fur. (Photograph by the author of the drawing of the New York weasel by Leon L. Pray in Cory's Mammals of Illinois and Wisconsin.)

It is remarkable what big creatures an ermine will attack and sometimes overpower. The writer believes it was Nelson who stated that in the far north the Juneau ermine will, with ease, overcome a ptarmigan or any of the large northern hares. He simply runs them down, jumps on their backs, and a few bites at the neck closes the tragedy. To suck as much blood as his fancy dictates is the next operation, when his inborn cruelty impels him to seek other victims to satisfy his rapacious appetite. Indeed, if one has ever had the opportunity to corner an ermine in some cavity or other, and looked in upon the little bloodthirsty vagabond, his face is a very good index of this character; it is stamped with the very personality of cruelty and power. His lancet-like teeth may grin at you; he glares at you, while his small eyes seem to actually glisten with a greenish light, intensifying their penetration and cunning. He has all the appearance of the deadly rattler about to strike, and fortunate it is that he lacks the material in his organization to render the bite a venomous one.

In America ermine skins are but little sought in the fur trade, as the demand for them is small. In the Yukon region the natives hardly think it pays to trap them, so limited is the call for their pelts. Our Indians in the north use the tails or even the skins of the entire animal in their ceremonial attire, or attached to some of their implements and fetiches.

In closing the article the writer desires to express his thanks to the National Museum authorities for the facilities extended in the matter of photographing specimens of mounted weasels in the exhibition series of that institution, and more especially to Dr. James E. Benedict, Chief of Exhibits, who, upon this and numerous other occasions, did all in his power to see to it that everything necessary to the accomplishment of such a piece of work was promptly made available.

THE BOY TOSSED A DELICIOUS CABBAGE LEAF TO MAMMY COTTONTAIL AND HER MOUTH WATERED AFTER THE LONG, COLD WINTER, WITH ITS HUNGER PAINS AND FEAR OF DEATH

MAMMY COTTONTAIL AND TROUBLE

BY ALLEN CHAFFEE

AUTHOR OF

"THE ADVENTURES OF TWINKLY EYES," THE LITTLE BLACK BEAR

(WITH ILLUSTRATION BY PETER DA RU)

III. A VISIT TO THE VALLEY FARM

THE cabbage the boy was throwing to the chickens had been frozen, but that made no difference to Mammy Cottontail. It was a delicious odor for a bunny hungry enough to eat dry bark. And her mouth watered at the thought of how a leaf would taste. How long the winter had been, with its cold and hunger and its fear of death, as one enemy after another had tried to catch her.—And memories came of the long summer days in the cabbage patch in the clearing, when she had feasted fat all day long, hiding under the giant leaves. There, not even the boy from the Valley Farm could find her, when she chose to play hide and seek.

Wriggling her little black nose this way and that to sniff that cabbage aroma, she ventured around the old stone wall and across the snow that had drifted over the barn-yard fence. It was a cheery scene. Not only were the chickens clucking over the unexpected meal of green stuff, but the cows and sheep and horses in the barn were munching and crunching and enjoying their suppers, as the boy passed from one stall to another.

Even Lop Ear, the Hound and Barnyard Thomas had their bones, which they mouthed with much growling and licking of chops as they eyed one another.

Mammy Cottontail crept just behind the gate post, and there she crouched, so motionless that the boy had to look twice before he realized she was not just a knobby little chunk of wood.

When he did see her, he tossed a juicy cabbage leaf her way.

"Hello, there, is that you, Bunny?" he called softly. "I'll bet you came because you smelled the cabbage, didn't you?"

This was too much for Mammy. She didn't understand the words, but she did his action, and she crept a little nearer.—The best of us are bound to be rash sometimes, and there is nothing much harder than to watch others eat when you are hungry.

Now the door to the cow stable was opened, and the milking pails brought forth. The cat, at least, had gone,—though just where, Mammy had not seen.

"Isn't it mild this evening, Father?" asked the boy, as the farmer came down to pitch hay for the horses. "Wish you'd let me drive the cows outside, where it is lighter, while we milk them!"

"Go ahead," said the farmer, gazing off at the red glow of the sunset, which had piled rose and purple clouds above the snowy horizon.

And the next thing Mammy knew, the six red cows were trampling the snow in the pasture between her and her orchard.

Now she was surrounded!

Yes, sir, Mammy Cottontail had no sooner crept forward for that cabbage leaf than she found herself surrounded. On one side was the barn, on the second the circle of red cows, while on the third her escape was cut off at this moment by Barn-yard Tom, whom she spied creeping toward her along the top of the fence. In the only direction left, the Hound sprang up with a yip of delight as she made a wild dash to get past him. There seemed to be no way out!—And the cabbage not yet tasted for which she had risked the safety of her Old Apple Orchard!

If she had not been faint from hunger, she might have ventured a straight-away race with the Hound. But she was weak and famished, and besides, the snow had covered all her favorite hiding places. Things certainly looked bad for Mammy Cottontail!

Then,—swift as a streak of lightning,—mammy turned and darted between the legs of the six red cows!

Now the cows hated Lop Ear the Hount. Distrusting him at best, when he came baying at them full tilt after Mammy, they over-turned their milking pails and gathered in a circle, lowering their horns at him and mooing their displeasure.

"Here! Lop Ear!—Home with you!" commanded the farmer sternly. And the spotted hound, afraid to disobey, gave up the chase, and slunk crest-fallen back to the farm house porch, where he sulked with nose between his paws, even when the boy poured the foam from the milk pails into his pan.

Meantime Mammy made good her escape. And that night the boy followed her tracks to the orchard by the light of the moon, and left her a cabbage as big as herself. And for many nights thereafter he remembered his tiny neighbor, as he did Chickadee,—till spring had once more spread her feast of plenty for the furred and feathered folk.

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"HALL OF FAME" FOR TREES

George Washington tied his horse to a ring in this tree in front of the Timothy Ball House at Maplewood, New Jersey, according to the data sent the American Forestry Association by Frank J. Parsons, who nominates the walnut for a place in the Hall of Fame. This tree is said to have been planted at the time the Timothy Ball house was built in 1743. When visiting his cousins, the Balls, General Washington is said to have frequently hitched his horse to an iron ring which for many years was attached to the tree. Old residents now living recall this ring. The Rev. George W. Clark, a great-grand-son of Timothy Ball, in his book, "Struggles and Triumphs of a Long Life," refers to the old tree as follows: "When I was a boy, in 1849, the tree was then of tremendous size and the records of the times tell of a ring to which the horse was tied. This tree was used as a dividing line by the congregations of the Presbyterian Churches of Orange and Springfield, it being approximately three and a half miles from each church. Those on the South side were expected to attend the Springfield Church and those on the North side the Orange Church."

This white oak is nominated for a place in the Hall of Fame of the American Forestry Association because it is more than 250 years old and is a tree "without a heart." The tree is on the estate of Carl O. Hedstrom at Portland, Connecticut, and the trunk is hollow. This hollow trunk has been filled in and the tree is as good as ever, says N. A. Millane, who nominates it for a place in the Hall of Fame. In excavating the trunk of the tree a bottle was found in which was a man's name and address showing the tree's great age.

"HALL OF FAME" FOR TREES

Here is the Wethersfield Elm, for which the claim is made that it is the largest elm in the United States. The age of the tree is 250 years, the height 97 feet, it has a spread of 147 feet and a circumference of 28 feet. Some of the limbs extend sixty feet from the trunk and two of the limbs were destroyed in storms during 1918.

A great deal of care has been given this tree by the improvement association of this Connecticut town and a great deal more care must be given it, experts say, in order to save the tree. N. A. Millane, of Middletown, Connecticut, also nominates this tree for a place in the Hall of Fame of trees being compiled by the American Forestry Association.

Beneath these trees the most famous, twelve white oaks in the United States, General Washington often sat. They have been nominated for a place in the Hall of Fame of the American Forestry Association at Washington, which asks for data and pictures of trees with a history. The trees in this picture were planted in 1730 on the Baylor-Newmarket Plantation in Caroline County, Virginia. J. B. Baylor, who nominates them for "Who's Who," says that two famous men were born in a house once within the shade of these trees often visited by General Washington. One was Colonel George Baylor, aide to General Washington; and the other was Major George Armistead, who was in command at Fort McHenry when Key wrote the National anthem.

NEW FRIENDS BEING MADE FOR

WITH the coming of Spring the editors of the country are continuing their co-operation with the American Forestry Association's drive for the planting of memorial trees and "Roads of Remembrance." These two campaigns have awakened new interest in trees all over the country and, together with the "Hall of Fame" for trees with a history, the Association is being introduced in new places every day. The first shipment of tree seeds to Europe brought forth widespread comment on the good work of the Association and again directed attention to its campaign for a national forest policy. Taking up these subjects, we find editorial comment from coast to coast. Some of this follows:—

Seattle Times:

A campaign is being carried on throughout the United States by the American Forestry Association of Washington, D. C., urging motorists to help, by planting memorial trees along the highways, to beautify the roads for which hundreds of millions of dollars have been voted by the various national, State and local governing bodies. Motorists everywhere will gladly aid this excellent movement, and will undoubtedly join the Association so as to work in conformity with its plans.

Local communities and commercial interests will benefit, and motorists, who are the greatest users of roads, will derive pleasure and reward for generations to come, if they, individually and collectively, co-operate in the actual planting of trees in accordance with the general plan.

Cross-country touring from the Atlantic to the Pacific is becoming more popular every year, and it will be possible eventually to have trees growing the entire distance on both sides of the 3,000-mile highway, making it the most wonderful monument and "Road of Remembrance" in the world.

Morgantown, W. Va., Post:

The plan of the American Forestry Association to cast a halo of sentiment around good road construction is an excellent one, both for the promotion of road building and the creation of large popular interests in the purpose of that Association to preserve and restore our vanishing forests. We have heartily commended the idea of these memorial trees and the sentiment they would perpetuate, and we welcome this practical move on the part of the American Forestry Association. Tree bordered highways, with such sacred associations, would be something more than mere roads in the minds of the people, and the voting of bonds or taxes for making them good roads would be far more popular.

Providence Journal:

"Roads of Remembrance," advocated by the American Forestry Association, have material as well as sentimental value. Memorial trees at this time are as appropriate as memorial highways, and no State can afford to overlock the possibilities of well-shaded roads. This is a good time for tree planting, and existing road departments can do the work without calling upon the taxpayers for large appropriations. Trees are comparatively inexpensive, the land along the roads need not be bargained for, and forestry experts for supervising the preparation of the ground and the setting of oaks, pines, elms or maples are always available. For nearly 300 years Americans have been destroying their forests; it is time for the inauguration of a different policy, and memorial highways, while offering, of course, no large solution of the problem, would be a step in the right economic direction, in addition to their esthetic and sentimental value.

Wisconsin Motorist:

A very worthy compaign is being carried on throughout the United States by the American Forestry Association of Washington, D. C., urging motorists to help, by planting memorial trees along the highways, to beautify the roads for which hundreds of millions of dollars have been voted by the various national, State and local governing bodies.

Motorists everywhere will gladly aid this excellent movement, and will, undoubtedly, join the Association so as to work in conformity with its plans rather than go about planting inappropriate trees in undesirable places.

Meridian, Miss., Star:

When a given product bids fair to last thirty or forty years ahead it is rather difficult to awaken public interest to the necessity of seeing that the product, if it be worth while, lasts longer than that number of years, to see, in fact, the need for preventing exhaustion of that product.

Charles Lathrop Pack, president of the American Forestry Association, is endeavoring to awaken the public mind to the need of replacing the American forests. He has been at it for several years, but has, we presume, found it "an endless job," though he has never given up hope. He is distributing literature, through woman's clubs, churches, civic organizations and the newspapers, in his efforts to reach the public and to create an interest in forestry. Among his first steps was to endeavor to secure the co-operation of owners of timber land and forests in adopting a fire-protection policy.

He suggests, through clubs and civic bodies, that as new highways are built and old ones rebuilt, trees be planted along these highways, as memorials to men who gave their lives to their country—the doughboys, the marines, the sailors and others. This suggestion is meeting with a generous response. Trees are being planted as memorials, remembrances and monuments.

Paterson Evening News:

The American Forestry Association has issued an appeal to every school in the country to plant a tree. Tree-planted schoolhouse grounds will serve several ends. If every schoolhouse could be made a center of pretty landscape gardening, the idea would spread from the children to the homes. People would want the grounds around other public buildings improved. The unsightly railroad stations and other structures which now serve the public so shabbily would be given a setting of foliage.

Children who acquire this idea of beautification will keep it when they grow up. When they move to a newly laid out street they won't be content with treeless land and shrubless soil, but will want a nest of verdure around their homes. This will improve property, make real estate more valuable and give a town a reputation for improvement spirit. These children would be apt to become more interested in trees, learn how much value they add to waste land, and perhaps do some reforestation if they ever own land.

White Plains Reporter:

If the people of the United States want to establish a memorial for all time in honor of Theodore Roosevelt, let them link his name with a nation-wide movement to establish a national forest policy. This was the message to the Tristate Forestry Conference by Charles Lathrop Pack, president of the American Forestry Association of Washington. Mr. Pack urged everyone to join the American Forestry Association in its campaign for a national forest policy.

Hammond Times:

If there is one man in American history besides Washington and Lincoln who deserves a memorial that the entire nation should take pride in, that man is Theodore Roosevelt, because he would have been the last man to seek such an honor.

Nation-wide planting of memorial trees and the naming of a great national highway in honor of Theodore Roosevelt have been suggested by Charles Lathrop Pack, president of the American Forestry Association.

FORESTRY IN ALL PARTS OF THE WORLD

Boston Traveler:

On Boston Common representatives of the American Forestry Association presented to consular agents of Great Britain, France and Belgium, 35,000,000 tree seeds.

What finer testimony of American interest in the economic reconstruction of these Allied countries could be given? Millions of trees, replacing those cut down or demolished in the war, will in future years remind these peoples who sacrificed so much to save civilization, that the United States, less afflicted by war, gave freely of its resources, not only for war, but for the replacement of war losses.

The need of reforestation is apparent from the fact that Great Britain cut down more than half its standing timber during the four years of titanic conflict. In France and Belgium, although the percentage of trees destroyed was smaller, the damage in the battle zones was more complete.

A happy thought was that which found expression in this gift of tree seeds.

Washington Herald:

The American Forestry Association has shipped to Europe 35,000,000 tree seeds with which lands swept by war or estates stripped of their forests for use by the Allies in legitimate military operations may be reforested. Great Britain, France and Belgium will get most of these embryo oaks, maples, firs, larches and ashes; and a generation will look upon them in their glory, let us hope, that will not have to see them converted into trench and mine supports or decimated as they stand by the fire of guns.

This gift has been made possible by voluntary giving. It has not come out of the public treasury. It represents the goodwill of a very fine corps of professional men, some of whom learned the fundamentals of forestry in Europe or from Europe's literature on the subject and who thus feel that they are in a way paying a natural debt of gratitude.

It also represents the opening of purses by other people, who like to make their money investments, even those of goodwill, as enduring as possible. He who invests money in a tree wherever planted benefits society in a variety of enduring ways, not at all subject to the mutations of the stock market, or the reversals of personal or party fortunes, or the ignorance of men in high places in state and school. He sets up a league with nature, becomes an ally of sun and rain, and establishes working relations with the unmoral forces of life, which often are so much more likeable than the moral and immoral ones, because so impartial, enduring and great as contrasted with the pettiness of man in his efforts to do both right and wrong.

In this particular instance the tree-planters are in their own quiet way, while diplomats, statesmen, financiers and class-conscious groups wrangle over the reconstruction problem, doing an effective job in genuine A No. 1 internationalism. The more money the American Forestry Association gets for this work the more seeds will go to Europe.

Boston Evening Transcript:

A really wonderful gift is the present of forest tree seeds which the American Forestry Association makes to the representatives of Great Britain, France and Belgium on Boston Common. The lives of millions of human beings and of horses are not the only lives sacrificed in vast numbers in the great war. Millions of trees, and indeed whole splendid forests, have gone down in the conflict. Wooded areas in France and Belgium are incapable of spontaneous restoration, so complete is the destruction; the land must be prepared and re-seeded. In Britain, where the sacrifice of the woods has been only through cutting for war uses, and not by the wholesale destruction of actual warfare, spontaneous or locally provided seed restoration should be possible. But great quantities of forest tree seeds are needed from abroad for prompt restoration. About the only European forest or propagating grounds which could supply these seeds are those of Germany. And under all the circumstances it is probable that the Entente peoples would much rather look to America for forest tree restoration than to Germany.

The sentiment of the transaction is all right. Nothing can be more appropriate than that America should bear to ravaged France and Belgium the gift of trees. The American Forestry Association has done a noble thing in donating the seeds.

A GIFT TO EUROPE

A SHIP is now on its way to Europe bearing a gift to England, France and Belgium of a novel sort and fraught with many possibillities. We may assert that the voyage of this boat may teem with great consequences so that it may be comparable to the vessel which carried the first United States soldiers to the great war and it may prove to be of more importance than any of the trips of the steamship George Washington.

The boat carries 35,000 tree seeds, the gift of the American Forestry Association to aid in reforesting the three countries mentioned. The varieties of seeds include tideland spruce, white ash, rock maple, tulip, white fir, Douglas spruce, western larch, English spruce, red oak and scarlet oak. It will be seen that the conifers are in the majority and we are told that the seeds have ensured inspection and whatever else may be necessary to rid them of any form of fungi or disease and are further informed that other shipments will follow as fast as the seeds are collected.

There is need enough of these, for men who have been overseas have told us of the necessary or wanton destruction of trees in France and Flanders. Many will be surprised that there is need of reforesting in England, but the American Forestry Association says that during the war the English cut down more than half the trees on the British Islands in order to carry on war work, and thereby suffered a greater percentage of loss than either France or Belgium.

One may hope that the oaks will thrive, both the red and the scarlet, although we realize that the percentage of germination of acorns is low, as they will add to the beauty of the landscape no matter in what part of the world they grow. They may be deliberate in their growth but they, at least, can afford the time.

The tulip tree makes, we feel, more rapid growth than any of the other varieties in the list and yet, if these trees find the soil and climate friendly, they will be towering over French and Flanders fields long after the last veteran has gone hence and the war has become a matter of tradition to the people of France and England. Even then, if they grow, the oaks will be vigorous after the other trees have completed their growth and are serving the needs of the people. It is no small gift to Europe, these seeds that are now on their way across the ocean.—HARTFORD COURANT.

BLASTING TO AID CENTRAL PARK TREES

AN interesting experiment in the use of dynamite in aiding the growth of trees was recently made in Central Park, New York City. As explained in an article in AMERICAN FORESTRY Magazine (October, 1919), and as pointed out by Commissioner of Parks Francis D. Gallatin, the subsoil underlying the greater portion of Central Park hinders the growth of trees of the deep rooted species because the roots cannot penetrate it, and it also makes an artificial water level, keeping the top soil flooded during the wet season and abnormally dry during the dry season.

TREATMENT FOR DYING TREES

Francis D. Gallatin, New York's Commissioner of Parks, drilling a hole in the ground close to a dying tree. Nitro-glycerine was placed in the hole, and the ground around the tree shattered and broken in the endeavor to provide additional nourishment to the tree.

The experiment in blasting the soil was intended to shatter this impervious subsoil, permit better drainage and add to the vitality of the trees. The experiment was on the west drive, between Ninety-fifth and Ninety-sixth Streets under the direction of Commissioner Gallatin and in charge of City Forester J. S. Kaplan. Ten holes were made with a soil auger, about nine feet apart and at a radius of about twelve feet from the body of a pin oak tree about 21 inches in diameter. The holes were from two and one-half to three and one-half feet deep, depending upon the depth of the hard pan clay subsoil. Each hole was loaded with Red Cross Extra dynamite by F. T. Ransom, an expert of the Du Pont Powder Company, and all were fired together. The hardpan all about the tree was well loosened. In two of the holes pin oak trees three inches in diameter were planted and their growth will be watched with interest, and compared with the growth of similar trees planted in unblasted holes.

Commissioner Gallatin says: "I have given this matter considerable study for several months ,and upon the advice of Prof. J. W. Toumey, of the Yale School of Forestry, who made a comprehensive survey of the tree situation in Central Park with the Forester of this Department, we have decided to carry out this experiment through the kind co-operation of the Du Pont Powder Company."

DYNAMITE FOR TREE PLANTING

A tree being planted in Central Park, New York city, in a hole made by dynamiting the ground. The heavy subsoil in Central Park makes it difficult for trees to thrive there, as their roots will not penetrate it. Breaking up the ground in this way gives them a better chance.

If the experiment is successful it will mark the beginning of the mechanical rejuvenation of the soil in Central Park and will greatly improve and strengthen the trees.

THE following applied and were elected Life Members of the American Forestry Association in February:

Jane A. Tracy, Ohio.

Mrs. H. J. Lutcher, Texas.

Mrs. L. Carteret Fenno, Massachusetts.

Mr. E. P. Mellon, New York.

Mrs. Richard March Hoe, New York.

THE new envoy selected by President Wilson to serve as Ambassador to Italy is Robert Underwood Johnson. Mr. Johnson has long been associated with the American Forestry Association as a member, and he succeeds in his high office as American Ambassador to Italy the Hon. Thomas Nelson Page, who is also a member of the Association—a former Director and now a Vice President.

PINCHOT, PENNSYLVANIA'S NEW FORESTER

FOREST conservationists throughout the United States will view with favor the appointment of Gifford Pinchot as Commissioner of Forestry for Pennsylvania, as announced by Governor Sproul on March 10. Mr. Pinchot has been a member of the Pennsylvania Forestry Commission for a year. During that period he vigorously attacked the policy of Robert S. Conklin, who has been Commissioner of Forestry for the past sixteen years and whom Governor Sproul has now made a member of the board of water supply commissioners.

Mr. Pinchot accepts the position because of his deep interest in the work and his love of forestry and expects to institute various new measures in the management of the state forests. He says of his appointment:

"To stop forest fires and put back into the productive area of the state that 5,000,000 or 6,000,000 acres of unproductive land within our commonwealth, once among the richest forests of America, but now useless and barren, is in my judgment one of the biggest things that can be done for the State of Pennsylvania. I answered the call of the Governor to help him do it."

In commenting on Mr. Pinchot's appointment, Governor Sproul said: "I have commandeered Mr. Pinchot's services. We have in him a citizen, who is the foremost figure in forestry in the United States, and I thought we should have the benefit of his services at home. Mr. Pinchot has been used to handling national problems, but Pennsylvania is an empire in itself.

"Pennsylvania and the six states bordering it contain about 30 per cent of the entire population of the Union, and our state forests, which soon will be accessible by good roads, will be a benefit to all of those people. Our forestry work is one of the inspiring problems before us, and Mr. Pinchot's enthusiasm for that work and his devotion to it are recognized everywhere.

"There is no politics in his appointment. He and I sometimes do not agree in our politics and may not in the future, but we do agree in our desire to serve the state and in our belief that public good is the best political asset.

"There is no reflection on Mr. Conklin in the change. I have stated to him that no criticism that ever reached me of his department has reflected in any way on his official integrity or his personal honor."

NATIONAL HONOR ROLL, MEMORIAL TREES

Trees have been planted for the following and registered with the American Forestry Association, which desires to register each Memorial Tree planted in the United States. A certificate of registration will be sent to each person, corporation, club or community reporting the planting of a Memorial Tree.

LITTLE ROCK, ARK.

By Headington Chapter, U. S. D. 1812: Frank Adam Heisserer, Melchior M. Eberts, Fay P. Washington, Frank Dorsey Hussman, Lewis Paline, Clifton McDonald, Charles Sol Narkinsky, James Marion Lee, Jr., George S. Martin, James Boyd Jeffries, Jr., Curtis McElroy, C. G. McCoy, William Lee Linder, Allen B. Hearin, James P. Clarke, Leo Massar, John Randolph Wassell, Wesley Philip Boyce.

MILTON, FLA.

By Santa Rosa County Chapter of American Red Cross: Corporal David Frank Wilson, George Wiggins, Lt. Norman Ashton Garrett, Curtis McSwain Council, Robert Kimmons, Frank James Hopkins, Dewey Martin, Oscar Reuben McLean, Rollin Ellis, Ralph Redd, David J. Kelley, Albert Broxson, Charlie Simmons, Robert F. Edeker Leroy W. Beck, George Glover, Albert Anderson, Daniel Bradley, Walter Morton, Children of Santa Rosa County.

TAMPA, FLA.

By Civic Association: Cora Belle Davis.

ATLANTA, GA.

By Atlanta Women's Club: Tom Skeyhill. By Uncle Remus Association: Joel Chandler Harris. By Woman's Pioneer Society: Charles H. Hunter. By Joseph Habersham Chapter, D. A. R.: Mrs. William Lawson Peel. By New Era Study Club: Charles L. Smith. By History Class: Henry Woodfin Grady. By Modern Topics Club: Corra Harris. By the Reviewers: Frank L. Stanton. By Atlanta Music Study Club: Edward MacDowell. By Georgia Colonial Daughters: Dr. Lucian Lamar Knight. By Council of Jewish Women: Emma Lazarus. By Atlanta Chapter, D. A. R.; Mrs. Lollie Belle Wylie. By Shakespeare Club: William Shakespeare. By Atlanta Writers Club: Miss Mildred Rutherford, Jack London, John Masefield.

CRAWFORDSVILLE, GA.

By Woman's Club of Crawfordsville: Glenn Thomas Lavender.

HEPHZIBAH, GA.

By Woman's Club: L. L. Atkins, Capt. John F. Carswell, Lieut. James A. Carswell, Charles A. Carswell, Drew Christie, T. F. Christie, Capt. S. A. Clark, Sgt. Robert C. Coffield, Lieut. Thomas H. Frost, Lieut. Robert C. Frost, J. C. Henderson, Robert A. Harden, W. A. Harden, Paul A. Harden, J. F. Hartley, Thomas L. Kelley, Capt. Alex. T. Murphey, Jim C. Murphey, Sgt. George E. Murphey, Lieut. David G. Mann, Bowdre M. Norris, Hugh L. Rhodes, Guy C. Smith, Walter B. Trammell, G. A. Uhlm, J. C. Uhlm, M. I. Uhlm, W. B. Skinner, George W. Vance, Denver Winter, W. W. Winter, Fred E. Turner, Samuel S. McClelland, Roy W. Woodward, Sgt. Ellet C. Walker, John G. Weathersbee, L. G. Sumeran, Roberson Foreman, Adam Rearden, Jesse Jones, Willie Jones, Paul Templeton, Cheney Templeton.

QUITMAN, GA.

By Hannah Clarke Chapter, D. A. R.: Lieutenant Wilbur Oglesby:

WHITE HALL, ILL.

By White Hall Art League: Amos Walker.

MARQUETTE, MICH.

By Lake Superior and Ishpeming Railway Company: John H. Vidlund.

MANTEE, MISS.

By Mantee High School: Clarence Springer, Allie C. George, Guy George, Lynn George, John C. Caples, William Caples, Alfred Caples, Bernard Pate, Leo Hunter, Robert Scott Hunter, Leonard Scott, Ira Forrester, Elmer Womack, Jodie S. Davis, Braden Skelton, Claude Barton, Tommy Osbourne, Ben Johnson, John H. Moody, Clannie O. George.

ST. CLAIRSVILLE, OHIO

By Tuesday Night Club: Alice M. Young, Adelene M. Tallman, Ruth A. Butcher, Lula F. Sidwell, Margaret Greig.

PENBROOK, PA.

By Penbrook School: William James Taylor, Charles Henry Waltz, Robert Raymond Farling, Arthur Stoak, Walter B. Hinkle.

PROGRESS, PA.

Progress School: George Dewey Umholtz, James B. Martin, Ralph B. Kramer, Robert Heinley Hoke, Oliver Zeiders.

MITCHELL, S. D.

Mitchell Park Board: John Curtis Berry, Leroy George Fox, Wm. H. Jordan, Peter V. Brethorst, Lloyd A. Bishop, Howard Barton, William H. Coacher, Emil H. Carlson, Raymond S. Calkins, Wilber T. Derr, John W. Kempton, Emil Laurson, David McConnel, P. H. McManamen, Father C. E. O'Flaherty, McKinley Pound, Emil Rosenquist, Lester L. Slagle, Arthur Earle Shale, R. Carroll Thompson, Carroll B. West, Harry A. Hanson, Harold W. Gage, Edward Schmidt, Oliver L. Scott, Clarence McCune, Ray L. McLean.

TEXARKANA, TEX.

By High School: J. C. Watts. By Forestry Committee: Our Soldiers, Bowie and Miller Counties.

SECOND SOUTHERN FORESTRY CONGRESS

THE Second Southern Forestry Congress, held at New Orleans, on January 28, 29 and 30, was a fitting successor to the first Southern Forestry Congress, convened at Asheville, North Carolina, in 1916. While the first congress was admittedly "Southern in name only," a glance at the registered attendance at the second congress shows at once that it was indeed a Southern congress. Out of some 114 odd registered delegates there were 54 from Louisiana, 7 from Alabama, 6 from Virginia and from one to four from each of the following states: North Carolina, Georgia, Florida, Mississippi, Texas, Tennessee, Kentucky and West Virginia, with a few from other sections of the country than the South. The full program is, of course, too long to present to the readers of AMERICAN FORESTRY, but it may be said that the chief topic for discussion was the National Forest Policy of Colonel Graves, and that the outstanding feature of the meeting was the large number of interests represented. In addition to a goodly number of lumbermen, and representatives of the lumbermen's associations and the lumber trade papers, there were present and active at the meeting representatives of the turpentine and naval stores industry, paper and pulp industry, the furniture manufacturers, and the wood-using industries in general. The Southern Pine Association, the North Carolina Pine Association, the National Council of Furniture Associations, the Turpentine and Rosin Association, the American Hardwood and Manufacturers' Association, and the Southern Cypress Association were all represented at the meeting. In addition the railroads had sent six or more delegates, and the National Research Council, one. The Federated Women's Clubs of Louisiana were out in force and their active participation was one of the most significant features of the meeting. Members of the United States Department of Agriculture, the forestry organizations of four states, the United States Forest Service, and professional foresters and forest conservationists made up the balance of the attendance.

Wednesday, January 29, was devoted chiefly to a review of the progress already made in forestry in the South, and to Colonel Graves' presentation of his program for a national forestry policy. Governor-elect John M. Parker, of Louisiana, made a short address endorsing the objects of the meeting. Colonel Graves' program was first discussed from the point of view of the lumbermen, during which discussion Secretary Rhodes, of the Southern Pine Association, announced that he felt very hopeful that at its annual meeting in March, the Association would endorse the movement for a National Forest Policy. At that time a special forestry committee, which had been in conference with Colonel Graves, would submit a report on the latter's very practical program. The wood-using industries, represented by the furniture manufacturers and the sash, door, and millwork manufacturers, were next called upon for comment on a national forest policy, which they promptly endorsed.

Seventy-five delegates attended the banquet Wednesday evening, at which they were the guests of the Louisiana lumbermen, through the Louisiana Forestry Association.

Further discussion of a national forest policy from the points of view of the naval stores industry and the pulp industry marked the next day's sessions, after the secretary's report had been read and endorsed. It was voted by the Congress to continue the effort to raise funds for the erection of a suitable monument to George Washington Vanderbilt, one of the pioneers in the forestry movement in the United States. Among the valuable papers at these sessions were those by the secretary of the Turpentine Association and the Supervisor of the Florida National Forest. Two very interesting and important papers presented were a discussion by McGarvey Cline, of the Consolidated Naval Stores Company, of Jacksonville, Florida, of the Southern Pulp Industry, and a presentation of the forestry projects of the National Research Council, by Dr. H. E. Howe, of the Council. Considerable discussion also took place of the possibilities of combining stock-growing and reforestation on the same land, Professor S. M. Tracy, of the United States Department of Agriculture, being the first speaker. Two lumbermen, Mr. Henry E. Hardtner, of Louisiana, and Mr. R. M. Hogue, of Mississippi, described the success which had attended their own efforts at a judicious combination of these two valuable uses of the soil.

On the final day the Louisiana Forestry Association met jointly with the congress. After preliminary remarks by Ex-Governor Jared Y. Sanders, of Louisiana, and the Hon. Fred J. Grace, who was introduced as having been the first state forester of Louisiana, the subject of land classification was taken up under the leadership of Mr. Austin Cary, of the Forest Service, followed by consideration of the place of state forestry associations in advancing the cause of forestry. A very interesting paper on the turpentine industry of France was presented by Colonel T. S. Woolsey, Jr., of the Twentieth Engineers. The secretaries of the Southern Pine Association and the American Hardwood Manufacturers' Association reviewed the economic situation in their industries, and demonstrated the interest which is being taken by the lumbermen's associations in the question of forest conservation. The concluding subject was fire protection, with particular emphasis on the part played by the private owner and the railroads. State Forester R. C. Jones, of Virginia, was the chief speaker.

Before adjournment the congress passed a number of significant resolutions, the most important of which was that endorsing a national forest policy. Because of its importance this resolution is given in full as follows:

WHEREAS, The supplies of softwood and hardwood

timber in the Southern States are rapidly diminishing, with a consequent influence upon the price of lumber and other forest products, and

WHEREAS, The customary practice in lumbering and turpentining results in the denudation of the forest and the leaving of large acres unproductive and idle for indefinite periods; therefore, be it

Resolved, by the Southern Forestry Congress, That it deplores the continuance of such practice of denudation, and urges, in order that such practice may be avoided, the enactment of legislation by the Southern States that will prevent such denudation and will afford an opportunity for a natural replacement of forest growth on lands not suited or not now needed for agriculture or settlement; and, furthermore, the Southern Forestry Congress urges the States and the Federal Government jointly to co-operate liberally with owners in this direction.

Other topics covered in the resolutions were the leaving of seed trees by the lumbermen, rational forest taxation, establishment of state forestry departments, acquisition of state forests, extension of purchase by the national government under the Weeks Law, increased Federal appropriations for fire protection under the same law, forest experiment stations, and endorsement of the forestry projects of the National Research Council.

In order to insure the continuance of the agitation for forest conservation in the South during the ensuing year, the appointment of five committees was approved by the meeting. In addition to the executive committee, these were the committees on finance, on forest policy, on legislation, and on publicity. The committees are expected to be decisive factors in the forestry fight in the South; their personnel will be announced later.

Election of officers resulted in the unanimous choice for the presidency of Mr. Henry E. Hardtner, President of the Louisiana Forestry Association, and of the Urania Lumber Company, of Urania, Louisiana. One of the earliest and most practical advocates of forestry in the South, and the father of most of the Louisiana forestry laws, Mr. Hardtner has proved the sincerity of his professions by expending considerable money and a great deal of time and thought on the reforestation of his company's lands in central Louisiana. Urania Forest, established with the co-operation of the Louisiana Department of Conservation, under Commissioner M. L. Alexander, has achieved national fame. State Forester J. S. Holmes, of North Carolina, whose patient and able handling of the arrangements for the congress was the largest factor in its success, was re-elected secretary. Much extra work had devolved upon Secretary Holmes as a result of the illness of Colonel Joseph Hyde Pratt, President of the Congress, who had not recovered sufficiently to attend the meeting.

Every delegate to the congress testified to the value of the papers presented and the discussions which took place. The unusual amount of publicity given to the meeting by the newspapers of New Orleans, particularly the *Times-Picayune,* and the enthusiasm and interest aroused is certain to bear splendid fruit in the near future. If the interest displayed in this meeting is any criterion, the Southeast, the last region of the United States to espouse forestry, bids fair ultimately to become one of the chief sources of the second-growth timber of the Nation. Undisputed leader today in the production of lumber and naval stores from virgin timber, in a few years the South is destined to take a like place in the support of forest industries based on second-growth.

THE FORESTRY SITUATION IN MASSACHUSETTS

DECEMBER, 1919, marked the retirement from office of the man who had served as State Forester of Massachusetts for some thirteen years and the appointment by Governor Coolidge of William A. L. Bazeley as the first incumbent of the newly created position of Commissioner of the Department of Conservation and State Forester. Notable progress was made, considering the humble beginning in 1906, during the regime of the former State Forester; and yet to those appreciative of the State's wealth, the intelligence of her people, the extent and potential value of her forest lands the development appears less than it should have been, due largely to the fact that the State Forester and the Massachusetts Forestry Association, during the last few years, failed to work in harmony. It was a most unusual situation, as logically a state forestry association is the strongest backer of the state forestry department, and it led inevitably to waste of energy and lessened accomplishment.

Mr. Bazeley, previous to his appointment a member of the Massachusetts Forestry Association, should be able to maintain the closest co-operation between the Association and the State Department. Massachusetts with her dense population, high industrial development, excellent transportation facilities and large percentage of lands best suited for tree crops affords an unusually good field for profitable forestry, both on privately and publicly owned lands.

The American Forestry Association congratulates the new Commissioner upon the exceptional opportunity, which is within his grasp, for constructive service and large achievement.

MAKE YOUR WOODLAND PAY

Farm forestry helps farmers in:
Marketing timber profitably.
Supplying timber for farm needs.
Furnishing paying employment during the winter.
Making waste lands yield a profit.
Increasing the sale value of the farm.
Farm forestry means:

Improving the woods by the right kind of cutting.
Protecting the woods from fire and other injuries.
Utilizing farm timber to the best advantage.
Reclaiming gullies and utilizing waste lands by planting forest trees.
Keeping woodlands growing at their maximum rate of production.

Farm forestry, as a branch of agriculture, is the handling of forest trees and woodlands in such a manner as to increase the income and permanent value of the farm and add to its comforts and attractiveness as a home.

CANADIAN DEPARTMENT

BY ELLWOOD WILSON

PRESIDENT, CANADIAN SOCIETY OF FOREST ENGINEERS

SIR LOMER GOUIN, Premier of the Province of Quebec, at the annual banquet of the Canadian Pulp and Paper Association, made a very able address in which he discussed the relations between the licensees of Crown timber lands and the Government. He showed an accurate knowledge of the industry and of the necessity for putting the forests of the Province on a basis of sustained yield. Under his government the Province has made remarkable strides in forestry and he told of his sympathy with the movement and his determination to aid it in every way possible. He suggested that the holders of timber lands should spend more money on forestry work and in taking care of their limits, and assured them that the Government would help in every possible way. He stated that the Government was ready to provide instruction in technical subjects connected with the industry just as it had in forestry and commerce and made a strong plea for the employment of the young men of the Province in the pulp and paper industry. The far sighted and statesmanlike policy of the Premier in regard to the forests is much to be commended and as long as he holds his position Quebec is assured of a sane and progressive forestry policy.

The pulp and paper mills have always tried to use local men for their work but the instruction in many of the technical schools is carried on more from the European point of view, and has not been up to the standard maintained by the best modern institutions. Progress is however being made and the schools are rapidly improving.

The conference on forest protection held under the auspices of the Quebec Forest Protective Association was very successful. Mr. Piche, Chief Forester of Quebec, read an excellent paper. The principal discussion was on railway fire protection. For years the fires set by the Canadian Government Railways have been numerous and unnecessary and in marked contrast to the number set by privately owned lines. The situation has become almost intolerable and the owners of timberlands have about reached the limit of their patience. It behooves the men in charge of the Government lines to adopt a modern policy of fire protection. The attitude of the local officials has been entirely different from their superiors and their co-operation with fire protective agencies has been all that has prevented disastrous fires.

The St. Maurice Forest Protective Association has continued its progressive policy and has voted an extra half cent per acre for protection during the coming season and has voted $20,000 as a special fund to clear of debris a strip of land one hundred feet wide on each side of the right-of-way of the railway passing through territory under its jurisdiction. Close accounts of cost will be kept and the work for this season will be in the nature of an experiment. This ought to be a great help in preventing railway fires and is a long step in advance in fire protection. The work will probably begin as soon as the spring danger season is over, by piling the debris ready for burning during rainy weather or with the first snow next fall.

Mr. Piche made a most important announcement on behalf of the Department of Lands and Forests of Quebec, i. e., that any holder of Government timber lands who wishes to begin reforestation on any part of his holdings, would on presentation and approval of his plan by the Chief Forester, be furnished the necessary planting stock free by the Government. This he would plant under the direction of the Government Forester, the total expenditure to be deducted from the stumpage dues payable to the Government for the current year. This means that the limit holder will furnish the cash for the work but the Government would really pay for it. This is a long step in advance and it is hoped will be the beginning of extensive reforestation.

The Woodlands Section of the Pulp and Paper Association at its annual meeting made the following report and recommendations. That the Executive Committee of the Limit Holders Association of the Province of Quebec should be constituted an advisory committee to confer with the Minister of Lands and Forests on all matters relating to lands held under license. That experiments be made in clean cutting at the option of the limit holder in conjunction with the Government Forest Service, the sample plots upon which such experiments are carried out to remain a distinct forest reserve for a sufficient length of time to permit of the results being studied. In order to increase the output from the woods, all operators are urged to utilize and remove all diseased, lodged, blowndown and burnt trees and all tops in their cutting areas if they are of commercial value. That the personnel of the Forestry Service be increased and larger cash appropriations be made for its maintenance and activities. That operators be advised that there are forestry engineers, graduates of the Quebec Forestry School, who might be available where their services are required. Resolutions were also adopted as follows: that it is in the interest of Canada as a whole and of the wood working industries in particular that the fullest information be made available as to the character and extent of the forest resources of the Dominion and as to the conditions which govern the growth and reproduction of the commercially valuable tree species. That the work of the Dominion Conservation Commission along these lines, already under way, be indorsed, with particular reference to the survey of the forest resources of the several Provinces, in co-operation with the several Provincial Governments, and the investigation of conditions of growth and reproduction of pulpwood species in co-operation with the pulp and paper companies, the Dominion Forestry Branch and the Provincial Forestry Services, and that proper financial provision for the continuation of these studies on an adequate scale be made recommended to the Dominion Government. The deep appreciation of the section of the commercial utility of the work of the Dominion Entomological Branch of the Department of Agriculture, particularly the section presided over by Dr. Swaine and devoted to the study and extermination of forest insect pests, was expressed and it was recommended that the responsible minister provide sufficient funds in the estimates for the current year to at least double the number of parties in the field. It was finally resolved that in view of the large number of fires set by coal burning locomotives, and the losses caused by such fires, that the railways passing through forest lands should be operated electrically wherever there are water powers available.

The death occured suddenly on Wednesday, the fourth of February, of Mr. W. C. J. Hall, for many years in charge of fire protection in the Department of Lands and Forests in Quebec and also in charge of the Laurentide National Park. Mr. Hall was one of the charter members of the Canadian Society of Forest Engineers and did yeoman service for the progress of forestry especially along the lines of better fire protection. He was also much in-

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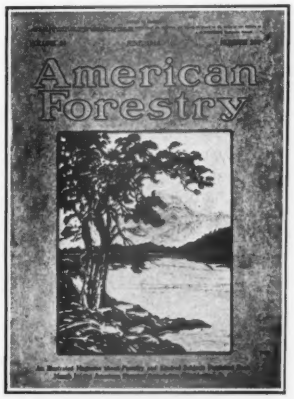
PROTECT FORESTS
USE FORESTS



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terested and very active in the protection of game and all kinds of wild life and the movement has lost a strong friend. All who knew Mr. Hall admired and loved him and his loss will be deeply felt.

The annual meeting of the Canadian Forestry Association was held in the Chateau, Frontenac, Quebec, on the third of February, and Mr. Ussher, of the Canadian Pacific Railway, was elected president.

Major-General J. B. White, of the Canadian Forestry Corps, was elected chairman of the Woodlands Section of the Canadian Pulp and Paper Association.

Mr. F. I. Ritchie, of the Wayagamac Pulp and Paper Company, was elected chairman of the Quebec Forest Protective Association.

Major Daniel Owen, President of the North American Securities Company, Ltd., who instituted and directed an airplane survey of timber lands in Labrador, says that for a rapid survey of forest lands the airplane photographs are very valuable. His method was as follows: to select a lot of two to three hundred acres and make a ground cruise, then to photograph this from the air. Photographs of other areas would then be made and compared with the ones of the ground-cruised area. The correctness of the method was proved by photographing unchecked areas and estimating them from the photographs and then checking on the ground. In every instance in which this was done, the air estimate was within ten to fifteen per cent of the ground estimate and was just as likely to be under as over in amount. The greatest difficulty encountered was in getting the approximate height of the trees. The majority of the photographs were taken at 1000 feet and whenever possible a cruiser was sent up as observer. About fourteen thousand photographs were taken covering the entire property. The property had been cruised for three years on the ground but Major Owen says that far more information of value was obtained in three weeks of flying than in the whole three years of ground work. His conclusion from his experience is, that an airplane photographic survey will show with absolute certainty the minimum amount of timber.

The Laurentide Company has had a party in the woods checking up aerial photographs, and so far the work proves Major Owen's contentions. This work will continue in the endeavor to work out a legend for reading aerial timber photographs. During the coming season this company expects to photograph several thousand square miles of its timber holdings. It has also adopted a definite reforestation policy and will plant up four to five hundred square miles in spruce at the rate of two square miles per annum for the next two years, increasing to four or five square miles per annum.

Captain L. M. Ellis, a graduate of the University of Toronto Forestry School, who worked with the Laurentide Company and the C. P. R. Forestry Service, and during the war with the Canadian Forestry Corps, has been appointed Chief Forester of New Zealand.

Captain H. R. Christie, returning from military service in Siberia, has been appointed Assistant Provincial Forester of British Columbia.

The British Columbia Forestry Service has reorganized and the salaries have been increased. This will set the pace for all other forestry organizations in Canada and will tend strongly to attract and hold able men.

Captain John Lafon, a Biltmore man, formerly with the British Columbia Forestry Branch has accepted a very remunerative position in charge of logging for the Indian Forest Service.

R. D. Craig, assisted by Major G. H. Edgecombe and Lieutenant V. A. Gilbert, is engaged in a survey of the forest resources of Ontario for the Commission of Conservation.

H. R. MacMillan, ex-Provincial Forester of British Columbia, ex-Trade-Commissioner for the Department of Trade and Commerce, has formed the H. R. MacMillan Timber Export Company with headquarters at Vancouver. W. J. VanDusen, has resigned from the British Columbia Forest Branch to join this new firm.

The forest survey of New Brunswick, under G. H. Prince, is progressing well. Thirty per cent of the area of the Crown timber lands have been covered to date. He has also consolidated scaling, fire protection, fish and game protection and forest administration under one organization. The elimination of patronage has also been brought about by the introduction of civil service methods through an advisory board.

GOVERNMENT TIMBER FOR LOCAL USE

A TOTAL of 30,000,000 feet of Government stumpage directly adjacent to Loyalton and Sierraville, Sierra county, has just been withdrawn from the general market and will be held for purely local demand, according to a bulletin from the Forest Service.

"The timber situation in the vicinity of Loyalton and Sierraville is rapidly becoming acute," said Assistant District Forester T. D. Woodbury, in commenting on the action of the Forest Service. "Comparatively large mills are now and have for some time been cutting in this vicinity, but practically all the lumber so cut goes to the general market only.

"A large part of the timber in this locality is in private ownership and it is probable that most, if not all, of this private stumpage will continue to be shipped out of the country. In order, therefore, that the future needs of these two towns and the adjacent Sierra Valley may be assured, we have decided to withhold this amount of Government stumpage from general sale and reserve it for local needs only.

"In addition, the Forest Service will henceforth refuse to allow logable, sound, saw timber in this locality to be used for firewood, even for local consumption. This will work no hardship, since there is plenty of limb wood, which is good fuel, easily available, which, by arranging with operating companies, can be obtained free by local residents. Under such circumstances it would be economically unsound to allow saw timber to be used for firewood."

TREE HISTORY PRESERVED

PLANS to preserve the history of every species of tree known throughout the world have been announced by Professor Charles S. Sargent, head of the Arnold Arboretum, of Harvard University, which has established the most complete collection of trees and shrubs in America, the finest library in its special field and a herbarium of 200,000 specimens.

Profesor Sargent, whso has accompanied explorations throughout North America and the Far East, declares that if the alumni provide the funds necessary to carry on the work, the arboretum will purchase more land, make new explorations and bring into the parks of America many more new trees and rare shrubs. The arboretum was founded in 1874, and is considered among specialists to be the most important institution of its kind in the world.

RECEIPTS FROM NATIONAL FORESTS

RECEIPTS from the National Forests in the fiscal year 1919 were greater by $783,484.79 than in the previous year. This is the largest increase ever made in a single year. The receipts totaled $4,358,414.86.

To this total the grazing business contributed $2,609,169.85, the timber business $1,540,099.96, special uses (i. e., the occupancy of lands for miscellaneous purposes), $136,822.99, and use for water power development, $72,322.06. The receipts from grazing exceeded those of 1918 by $883,347.91, while the receipts from timber declined $93,549.46. Special uses showed a gain of $15,615.05, and water power a falling off of $21,654.29.

DURABILITY OF GREEN TIMBER

THAT there is practically no difference in the relative durability of green timber and seasoned timber when untreated and exposed to the weather and in contact with the ground, has been established by recent experiments conducted by the Forest Products Laboratory in connection with the manufacture of poles, posts or ties.

STATE NEWS

CALIFORNIA

AT the eighth annual meeting of the California Forest Protective Association Secretary and Treasurer George H. Rhodes in his report for 1919, reviewed the forestry legislation enacted by the California Legislature of 1919, and directed particular attention to that which provides for a State Board of Forestry, consisting of "Four persons, one of whom shall be familiar with the timber industry, one with the live-stock industry, one with the grain and hay industry and one at large, who together with the State Forester, shall constitute the State Board of Forestry, which shall supervise and direct all matters of state forest policy, management and protection."

All the members of this board are appointed by the governor and serve at his pleasure. This board, having supervision and direction of all matters of state forest policy, management and protection will not only be an effective means of taking care of forest problems in California, but will also be in a position to co-operate in working out National Forest Policies and Legislation.

In the matter of forest fires, the report of the United States Forest Service covering the National Forests in California for 1919 showed that there were 1108 fires within the boundaries of the National Forests of which 19 caused a damage of more than $1000, 55 caused damage of from $100 to $1000 and 254 caused a damage under $100, leaving 780 which burned less than 10 acres and did no damage. There were 59,755 acres of timberlands burned over and 191,543 acres of open land. The amount of timber burned was 55,999 thousand feet, with a value of $133,025; the average amount of timber burned per acre was 982 feet, with an average value of $2.24 per acre.

Reports from private owners of timberlands outside and inside National Forests showed 19 thousand acres burned over, with a total damage of $40,000—$19,000 the cost of fighting fires, $45,000 the cost of protection against forest fires and 3,000 men available for fighting forest fires in emergencies.

There are 27 timbered counties in California and in 17 of these no timberlands were burned over during 1919, and this was the worst forest fire season since 1910.

There are approximately 15 million acres of timberlands outside and inside the National Forests in California and the reports of the United States Forest Service and the State Forester show that 75 thousand acres were burned over, with an average loss of approximately $2 an acre.

The secretary directed attention to the announcement of the State Board of Forestry that it has adopted four clauses for legislation to be considered and presented to the Legislature of California in 1920. These four clauses are:

1. Appropriation by the State Legislature of sufficient funds for the prevention and suppression of forest, grain and pasture fires outside of National Forests.

2. Acquirements of logged-off areas, both in the redwoods and pine forests, as a nucleus of state forests for future timber supply.

3. Acquirement of watersheds necessary for the conservation of water for domestic and irrigation purposes.

4. Renewal of forests on logged-off areas and watersheds that are in need of reforestation.

Board members pointed out that the forests of the United States are melting away at the rate of 40 billion feet board measure per annum in excess of what is grown, and that the next decade will see

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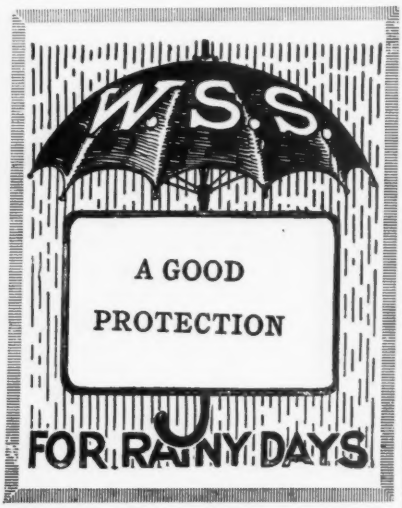

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AFTER BARK BORERS

REALIZING that the destruction of California pine timber by bark-boring beetles is a serious menace—a menace directly comparable only to that of forest fires—District Forester P. G. Redington, of San Francisco, has arranged for control work looking to the eradication of these destructive insects in some 115,000 acres of Government timber on the San Joaquin River drainage in the Sierra National Forest.

unprecedented logging and milling operations in progress on this coast because the forests of the Atlantic and Gulf States are practically gone. Practically no attempts are being made anywhere to provide for new forests on logged-off areas.

"Immediate action must be taken in California," declared Dr. George C. Pardee, Chairman of the Board of Forestry, "if this state is to profit by the mistakes of states and other nations that allowed their forests to be devastated without providing for future forests.

NEW JERSEY

THE FOREST FIRE SERVICE, which has been developed into an effective force with over 360 fire wardens, has been operating in the field on a pay-scale based on prevailing rates for common labor of 14 years ago. With changing conditions the morale of the organization is being maintained with more and more difficulty because there is less desire for appointment as fire wardens. This is true not only because they feel that their services are inadequately rewarded but because they find it increasingly difficult to secure the prompt and willing assistance that is so imperative in curtailing fire losses.

At the request of a large number of townships and after a thorough study of the situation by the State Fire Warden a bill has been introduced in the Legislature which provides an increase in pay of fire wardens while engaged in fighting fires to $2 for two hours or less and 50 cents per hour thereafter. The present rate is $2 for five hours or less and 30 cents per hour thereafter. The pay of fire wardens for other work would be increased from 25 cents to 50 cents per hour. The annual salary of $20 for township wardens and $10 for district wardens would remain unchanged. The pay of helpers fighting fire, which is $1 for five hours or less and 20 cents per hour for more than five hours, would be increased to $1 for two hours or less and 40 cents per hour for more than two hours. Helpers on patrol or employed otherwise than fighting fire would be increased from 20 cents to 40 cents per hour. Townships pay one-half of the cost of fire fighting and any township may fix its own rate, according to the bill, but in no case would the State's share be based upon a higher rate for services than that provided above.

A reorganization of the field force of the Forest Fire Service has been practically completed. The three-year terms of most of the local fire wardens expired this year, giving an opportunity to make desirable changes. The dead wood has been replaced by good timber and special efforts have been made to insure that wardens who have displayed ability be reappointed.

IN addition to the new forest fire lookout towers recently begun, New Jersey has just been assured that a fourth will be ready when the spring opens. Through the generosity of the New Jersey Zinc Com-

pany, this tower will be erected at Edison on the site of the "great inventor's" big iron mining property developed years ago and since abandoned. The tower will be the most accessible of those in the mountain country of North Jersey, being immediately adjacent to a well traveled public road. Despite this it will command one of the most beautiful and extensive vistas of the North Jersey area, making it unusually attractive for the pleasure-seeker as well as valuable for its primary protective purpose.

A careful estimation of the two million acres of woodland within the State places their present value at not over $6,000,000. State Forester Alfred Gaskill asserts that by checking abuse through fire, waste and neglect, and by putting the woodlands under practical forestry management, they can be developed into property conservatively valued at $200,000,000. While the people of the State are now importing twenty times as much timber as our forests produce, a large portion of future demands could then be supplied with local timber. To bring about these better conditions is the aim of the Department of Conservation and Development. To this end the State Forester is making a survey of present progress. Blank information sheets have been sent out to all persons who have indicated an active interest in the past. Anyone in New Jersey who has been engaged in the practice of forestry in any way can help greatly by informing the State Forester at Trenton of work done and results obtained, and by giving suggestions. The amount of active cooperation from forest owners determines to a large degree whether 45 per cent of the State's area shall be "despised waste land" or a highly productive woodland to be enjoyed by all.

WISCONSIN

THAT the work of the conservation commission in encouraging planting of forest trees on farm woodlots, estates and idle and waste land in Wisconsin is progressing favorably, is evidenced by the fact that during the last five years approximately 800,000 trees have been planted by citizens of this state. This work takes on an added significance this year.

The campaign to make Wisconsin increasingly beautiful, initiated by passage of the rural planning law in 1919 and the subsequent organization of rural planning committees in the counties draws attention to the fact that tree planting and tree conservation along highways, lake frontages and water courses is of first importance.

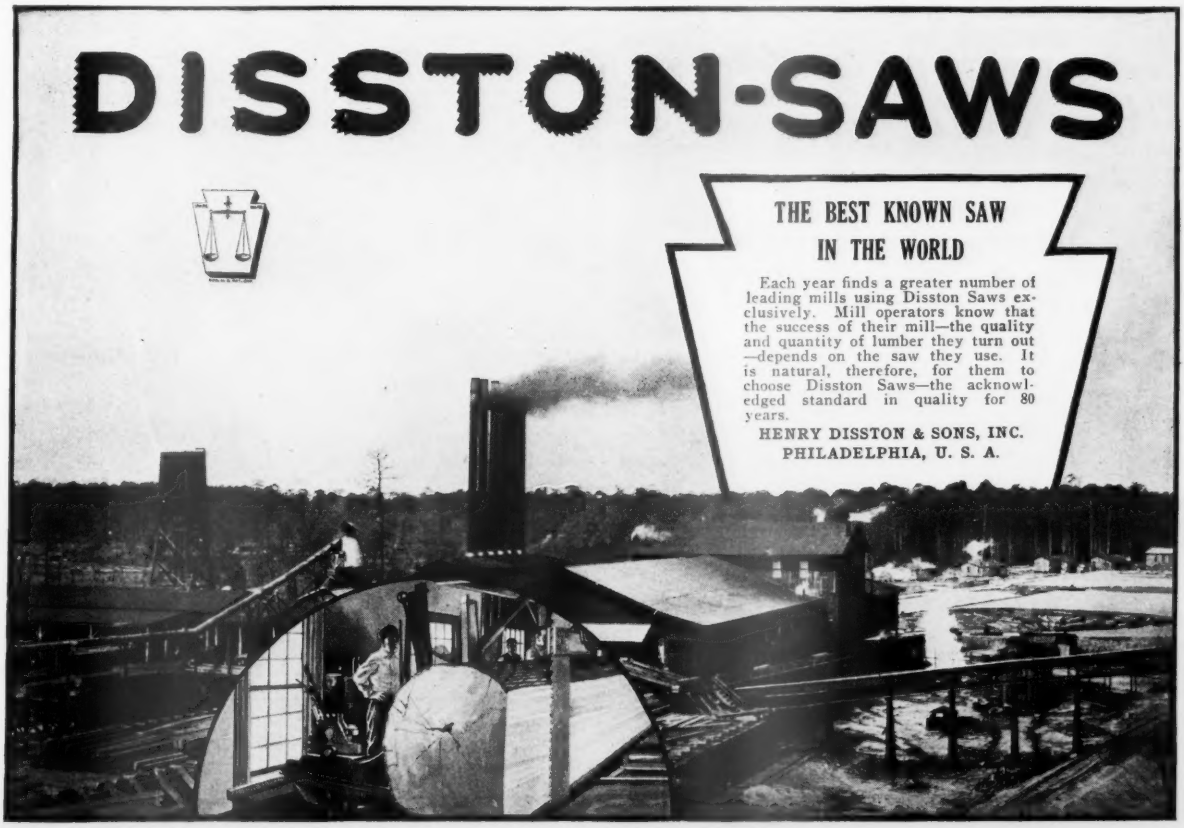
PLANTED FORESTS

THERE is a great advantage in planted forests over natural forests," says James S. Whipple, former State Forester of New York State, in a recent bulletin. "Density of forest growth is all important. That can be obtained in uniformity only by planting. Unless the growth is dense, close together, the trees will not do well. A tree standing alone grows to limb, is short and produces little or no lumber of value. If close together, trees grow tall, have few limbs and one tree will make several saw logs and produce much clear stuff lumber.

"A natural forest in the Adirondacks," he continues, "may produce if good, eight thousand board feet of lumber to the acre, sometimes more, sometimes less. A planted forest of pine, when mature, will produce from 50 to 80 thousand board feet of lumber on an acre. Therefore, we must plant forests."

MORE GRAZING IN NATIONAL FORESTS

THE demand for range on the National Forests was greater the past year than ever before in the history of the Forest Service, which branch of the United States Department of Agriculture has control of these tracts. Especially in the drought-stricken regions, stockmen, using the unreserved public domain or private pastures, eagerly sought forest permits in order to save their stock. The value of the system of range regulation in use has been so thoroughly demonstrated that representative stockmen from all the western States have declared emphatically in favor of placing the remaining unreserved public lands under Federal control and having them managed under a plan similar to that in effect on the National Forests.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DEPLETION OF OUR FOREST SUPPLIES

THE species of timber which form the bulk of our export trade, except Douglas fir, are those of which the supplies are most depleted. Thus, southern yellow pine forms half of our entire export trade, and the available supply is only 222 billion feet. At the present annual cut of saw-log size timber of nearly 17 billion board feet there remains only about 14 years' cut of the original supplies.

That these figures are not a mere theoretical calculation is proved by an official statement recently issued by the Southern Pine Association regarding the life of the southern pine industry. The Southern Pine Association estimates that 81.6 per cent of the mills will cut out their supplies in 5 years, 95.3 per cent in 10 years, and 99 per cent in 15 years.

JOHN C. OLMSTEAD DEAD

JOHN CHARLES OLMSTEAD, noted landscape architect and for many years a member of the American Forestry Association, died at his home at Brookline, Massachusetts, on February 24th. Mr. Olmstead was long associated with his stepfather, the late Frederick Law Olmstead, in business and his work included the architectural planning of grounds for universities, colleges, schools, capitol buildings, public libraries, public parks and extensive private estates. His career in his profession is marked by work in Boston, Cambridge and vicinity, New York, Buffalo, Rochester, Chicago, Milwaukee, Seattle, Spokane, Louisville; Hartford, Conn.; Fall River, New Orleans and elsewhere in the South. Mr. Olmstead was a member of many civic and scientific organizations, having formerly been president of the American Society of Landscape Architects, and his loss will be keenly felt by his confreres.

VOLUNTEER FOREST FIRE REPORTERS

A NEW call has been issued for volunteers—not for military duty, but for the important task of reporting forest fires in the Southern States. The Forest Service of the United States Department of Agriculture compiles reports regarding forest fires throughout the country which are invaluable to the conservation movement, and is in need of additional co-operators in the South, in order that it may have complete information regarding the frequency of fires in this region and the extent of their damage. In the North and West similar data are obtainable from State forestry officials, but in the South it is necessary to rely upon volunteer reporters. Already several hundred persons are co-operating with the Forest Service in this, but it is desired so to enlarge the force that much more complete information may be secured. Consequently the service desires to get in touch with any person in the Southern States who will be willing to assist in supplying this information. The duties of a co-operator do not require much time, the work consisting in making out an annual report as to the number of fires, their causes, the extent of the damage, character of the damage, and so on.

The seriousness of the forest fire menace in the South is shown by the following figures: In each of the past three years nearly 12,000 forest fires destroyed property in North Carolina, South Carolina, Georgia, Florida, Alabama, and Mississippi, valued at nearly $5,000,000; the total for the three years was 35,700 fires

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and a loss of more than $14,641,000. In the States of Missouri, Arkansas, Oklahoma, Louisiana, and Texas nearly 5,000 fires have annually destroyed $2,000,000 worth of property; the total for the three years is 13,983 fires, entailing a loss of $5,563,000. Thus in these two groups of Southern States, fires and fire losses for the past three years have reached the stupendous totals of 50,000 fires and $20,000,000 loss. With the exception of North Carolina, Louisiana, and Texas, no organized effort is made to control such fires, and even in these States the effort is far from adequate. The proposed enrollment of a large additional number of co-operators will, it is hoped, be a step in the direction of more widespread conservation.

CURRANTS AND GOOSEBERRIES SPREAD WHITE-PINE DISEASE

DESTRUCTION of all currant and gooseberry bushes within 900 feet of valuable native and planted white-pine trees is the urgent recommendation of Federal and State authorities to pine owners in regions where the destructive white-pine blister rust has appeared or is likely to appear.

This action is urged as a result of reports made when representatives of the northeastern and middle western white-pine States, the Canadian Government, and the United States Department of Agriculture met recently in the Fifth International White Pine Blister Rust Conference. It has been proved that blister rust spores may spread for many miles from white pines to currant and gooseberry bushes, and over relatively short distances from the currants and gooseberries to other white pines. Under most conditions, it is believed, a safety zone 600 to 900 feet wide around the white pines to be protected will interrupt the "vicious circle" of the disease and will allow the commercial growth of white pine. Other conditions, however, may require wider safety zones, and pine owners in the various regions are advised to ask their State forester or the United States Department of Agriculture for expert advice upon this point.

TREE PLANTING IN NEBRASKA

IN the State of Nebraska alone, where Arbor Day originated, 300,000,000 trees have been planted since 1872, when Hon. J. Sterling Morton, afterward Secretary of Agriculture, began his tree planting. In China the Ginling College Arbor Day ceremony is celebrated the first of April. Each class plants a grove of trees, one tree for each member of the class. Each girl uses the spade for her namesake tree. Secondary school teachers hope to establish the same custom on school property all over Central China.

"The Dessert Berry of the Nation"

The Erskine Park Everbearing Red Raspberry

"THE WORLD'S GREATEST EVERBEARING RASPBERRY"

was discovered on the Westinghouse Estate (Erskine Park) at Lee, Mass., by Mr. Edward Norman. This magnificent estate is in the midst of the beautiful Berkshire Hills, with a temperature in winter of 30 or 40 degrees below zero, so that the hardiness of this berry is unquestioned. The estate is surrounded by the summer homes of many wealthy people, and much to the surprise of his neighbor gardeners and not without a deal of personal satisfaction, Mr. Norman furnished large, luscious raspberries throughout the fall for various dinner parties.

These berries are commented on by all who have seen and tasted them as the most delicious and best raspberry they have ever eaten. Mr. Baker of Hoosick Falls, N. Y., writes us as follows:

"In the season of 1916, Mr. George M. Darrow of the United States Department of Agriculture was traveling from the Atlantic to the Pacific, visiting fruit growers to obtain information on berries for bulletins published by the Department of Agriculture. Mr. Darrow had visited this estate before, and was most favorably impressed that this berry was far ahead of the St. Regis and Ranere, and when it became known it would replace these varieties. The plant is by far the strongest growing raspberry I have ever seen. It branches like a tree, and it also has the largest and most roots of any variety with which I am acquainted. It is perfectly hardy and the berries are very large.

Conceive the joy and satisfaction of having such berries on your table all through the autumn, the source of wonder to your neighbors, that you can pick the finest raspberries until the snow flies. On November the 20th we cut a large branch of the Erskine Park with blossoms, green berries and ripe fruit upon it.

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GORDON PARKER, Colorado Springs, Colo.

DEAN BAKER'S NEW WORK

THE American paper industry has taken over Dean Hugh P. Baker, head of America's biggest forest college—the New York State College of Forestry at Syracuse, under conditions which indicate both that America's timber industry appreciates the need for a study of future raw materials, and for men with a technical knowledge of forestry in industry, and also that American education does not offer sufficient financial inducement to hold as college officers men who are wanted in business.

Dr. Baker resigned January 10 to accept twice the salary which he is now rated as receiving, to become secretary-treasurer of the American Paper and Pulp Association, with headquarters at New York. He was to take up his new work about March 1. The trustees will select a successor to Dr. Baker at the July meeting, unless a special meeting is held earlier.

The selection of Dean Baker for the executive officer of the parent association of America's great paper industry, means, according to Dr. Baker, a greater opportunity for the advancement of the principles of the forestry profession than is possible in any college. His letter of resignation outlines important phases of American forestry development of the past eight years, and also discloses that in the spring of 1919 he refused an offer of $7,500 from the outside, to remain as Dean of the College at a $6,000 salary. Even this sum he was not to receive at once, for under the rigid New York State budget the raise would not become operative until July 1, 1920, and then only after action by the legislature.

FORESTERS' WEEK

FORESTERS' WEEK, an innovation in New York forestry work and in the educational field, will be held at the New York State College of Forestry at Syracuse for the week beginning Monday, April 12. Special days will be devoted to particular features of the forestry problem. The Southern Pine Association, for instance, has already arranged to have its salesmen for this part of the country here for one day of special study of forestry problems to aid them in their work in the lumber industry. Another day will probably be devoted to the problems of the municipal forests, and other days to other typical problems of the forest products industry.

FIRE FIGHTING COSTS

THE federal government spent $2,500,000 fighting forest fires in the Inland Empire during the 10 weeks of fires last summer, according to a statement by R. W. Fraser, forest supervisor. The district covers northeast Washington, northern Idaho and western Montana. "This is a record-breaker for expenditure," said Mr. Fraser. "The many fires and the long season of fire fighting this year was also very unusual."

BOUQUETS

"I wish to compliment you, yes, congratulate you, on the excellence of your magazine. To be identified with your organization as a member I prize very highly indeed."

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"I find the AMERICAN FORESTRY magazine very helpful and interesting."

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"I wish to congratulate you very heartily on the January number of AMERICAN FORESTRY. It is superbly good and absorbingly interesting."

HENRY S. DRINKER,
President of Lehigh University.

"AMERICAN FORESTRY is a most valuable and interesting magazine and I recommend it widely."

MARY LATHROP TUCKER,

"I appreciate the good work done by the Association in the two years just past and congratulate you on having come through a difficult time with success. I wish for the Association an ever greater degree of usefulness and an ability to carry out its new work."

HARRIETT E. MCBRIDE,

TREE PLANTING IN CHINA

AMERICAN college girls are introducing Arbor Day as an international holiday into China. Reports from Ginling College, Nanking, China, tell of the fourth annual tree-planting by students of the college and the setting out of plum and mulberry trees in honor of the Sisterhood of Women. Ginling College, founded in the ancient Chinese capital, is the third of the Union Colleges now established in China by five of the American missionary boards of the different denominations.

KILN DRYING TAUGHT BY MAIL

THE manufacturer who uses lumber as a raw material must give more attention to kiln drying than has hitherto been the common practice, or the resulting excessive waste and dissatisfied trade may cause embarrassment. The time has come when the average dry kiln operator must either improve his methods or give way to a more progressive man who has learned and kept in touch with more modern methods.

The high cost of lumber and labor, a shortage of thoroughly airdry stock, as well as a general movement for efficiency in production make better methods imperative. Losses due to inadequate methods of kiln drying, especially of stock which is not thoroughly air-dry, often run as high as 30 to 50 per cent, and occasionally even 100 per cent of the value of the lumber. A high percentage of loss is often taken more or less for granted and its seriousness not considered. Present conditions, however, will force the facts to the attention of the manufacturer. Improper kiln operation means not only a loss of lumber and time, but also poorer goods, fewer orders, less profits, and finally the loss of trade to more alert and up-to-date competitors.

Kiln drying of wood is not just a job. It is an art based upon exact knowledge. It requires an understanding of certain fundamental principles, and their application in the daily operation of the kiln. To be efficient the operator must be up-to-date in his methods relative to the best present practices.

Within recent years the principles underlying the successful kiln drying of airdry and green lumber have been worked out by the United States Forest Products Laboratory, which is maintained in co-operation with the University of Wisconsin.

The Wisconsin University Extension Division has arranged to disseminate some of this information by means of a ten-lesson correspondence-study course. The course is written in simple language, and the text is supplemented with numerous illustrations.. It is open to anyone with a common school education. The lessons do not apply to any particular type of kiln, but rather to the conditions necessary in any kiln in order to bring about good results in the drying of various kinds of lumber.

The course is conducted by Mr. Arthur Koehler, of the Forest Products Laboratory, who, on account of his connection with the institution, is in close touch with the latest developments in kiln drying practice. A nominal fee is charged to cover a small per cent of the expense involved in rendering this service. For further information address the Extension Division, University of Wisconsin, Madison, Wis.

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Students from other states will be allowed to enter provided there is no four-year forestry course given in their state.

For further information address,
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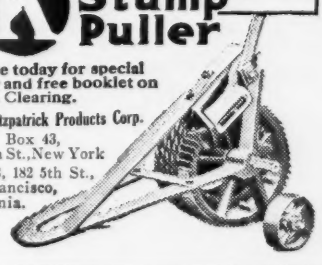

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SALE OF TIMBER,
MESCALERO INDIAN RESERVATION,
ELK AND SILVER CREEK UNIT

Sealed bids in duplicate, marked outside "Bid Elk and Silver Creek Unit," and addressed to Superintendent Mescalero Indian School, Mescalero, New Mexico will be received until twelve o'clock noon, Mountain Time, Saturday, May 1, 1920, for the purchase of timber on a tract within the Elk and Silver Creek drainage areas on the southern part of the Mescalero Indian Reservation lying west of the range line between ranges 14 and 15 East of New Mexico Principal Meridian. The said unit includes about 30,000 acres of unallotted timber land with an estimated stand of one hundred seventy million feet as to which contract will be made with the superintendent. Approximately 55 per cent of the timber within the unit is western yellow pine (including so-called "Black Jack" or "Bull Pine.") 30 per cent Douglas fir and 15 per cent white fir. Mexican pine and Engelmann spruce. Each bid must state the price per thousand feet Scribner Decimal C Log scale that will be paid for timber cut and scaled prior to April 1, 1925 Prices subsequent to that date are to be fixed by the Commissioner of Indian Affairs by three year periods. No bid of less than three dollars ($3.00) per M feet for yellow pine and Douglas fir, two dollars ($2.00) per M feet for Mexican white pine and Engelmann spruce and one dollar ($1.00) per M for white pine during the period ending March 31, 1925 will be considered. Each bid must be accompained by a certified check on a solvent national bank, payable to the Superintendent of the Mescalero Indian School in the amount of ten thousand dollars ($10,000.00). The deposit will be returned if the bid is rejected but retained as liquidated damages if the required contract and bond are not executed and presented for approval within sixty days from the acceptance of a bid. The right to reject any and all bids is reserved. Copies of the bid and contract forms and other information may be obtained from the Superintendent, Indian School, Mescalero, New Mexico.

CATO SELLS,
Commissioner of Indian Affairs.
Washington, D. C., February 14, 1920.

FOREST SCHOOL NOTES

UNIVERSITY OF CALIFORNIA

THE opening of the spring semester in January showed a decided increase in enrollment in the various forestry curricula and courses. Twenty-two men were enrolled in the curriculum in general forestry. Ten are taking up the work in forest utilization and seven have entered the five-year combined course. In the beginning course in forestry which is open to all students in the University, Professor Mulford is lecturing to one hundred and forty-eight students. Nine sections have been formed in this course for recitation work, the texts used being the following: Primer of Forestry, Gifford Pinchot; Our National Forests, Richard H. D. Boerker; Forestry and Community Development, S. T. Dana; Farms, Forests and Erosion, S. T. Dana.

The Friday morning conference course for all members of the forestry faculty and upper division students is proving of great interest and value to all concerned. The topic "Are Foresters Necessary" after much discussion was finally settled very decidedly in the affirmative. The concensus of opinion was that the period of greatest promise and usefulness for trained foresters in the United States is just beginning.

The forestry club held its first meeting of the semester under the leadership of the newly elected officers on the evening of January 27th. Over fifty men were present, thus establishing a record for attendance. A committee reported on conferences with the Labor Day Committee of the Associated Students in the matter of the planting of a memorial grove of the *Sequoia gigantea* on the campus to the California men who fell in the war. The only objection seems to be that it is not a large enough project to keep the whole student body busy, but the committee have hopes that it may be done in connection with some other piece of work.

Earl M. Blair, '20, was elected vice-president of the Intercollegiate Association of Forestry Clubs and was California's representative at the meeting of this Association held during the last week in February at New Haven. The sum of $175 was raised by active members of the Forestry Club towards defraying the expenses of the delegate to this meeting and an appeal to alumni was made for assistance in completing the necessary sum. The California Club believes heartily in the Intercollegiate Association as a means of better understanding between foresters from the several schools. Delegates to former meetings have brought back much of value and we believe the recent meeting will be well worth the expense involved.

Following the student self-government plan which is in effect throughout the University, the men who are going to the forestry camp in Plumas County next summer, held a meeting last week to arrange details of the camp commissary and other matters in connection with the 13 weeks course in the woods. Tom Oliver was elected camp manager.

Professor Mulford is planning to take the senior students on a week's field trip to the Del Monte Forest in Monterey County. This is one of the very few forest properties in the United States which is under intensive management so that opportunities for field students in silviculture are particularly good.

OREGON STATE SCHOOL OF FORESTRY

C. J. BUDELIER, a graduate in Logging Engineering of the Oregon School of Forestry, has been made woods foreman for the Portland Lumber Company at their Coweman camp near Corrals, Washington.

W. J. O'Neil graduated in Logging Engineering at the Oregon School of Forestry in 1917. He entered the service before commencement day and remained with the war game until the finish, returning from France with a commission as second lieutenant in the artillery. For the past few months he has been employed by the Alsea Lumber Company as assistant engineer. Recently he has been promoted to the position of chief engineer.

C. A. Fertig, graduate in Logging Engineering with the class of 1917 from the Oregon State School of Forestry, has recently identified himself with the Forest Products Sales Company of Astoria, Oregon.

PAUL C. FUGH, a Chinese student in the School of Forestry of the Oregon Agricultural College, is employed by the Y. M. C. A. in France. His particular business is to look after the interests of Chinese laborers who were brought into France by the Allies during the war.

A letter from Eastern Siberia states that L. D. Yates, a graduate of the School of Forestry, now first lieutenant in the regular army, is with the A. E. F. in that region. He writes that keeping warm and holding the Bolsheviks quiescent occupies his time completely.

At a recent meeting of the Board of Forestry of Oregon, H. J. Eberly, a graduate of the School of Forestry of the State College, and recently a captain in the Twentieth Engineers, has been appointed Deputy State Forester for Oregon.

At the December meeting of the Forestry Club, R. A. Chapler, of the Federal Forest Service, gave an interesting address

before the club on "The Progress of Protection." Chapler is now in charge of the Co-Operative Production work in District 6 under the Weeks' law. Among other things Chapler suggested that the time is ripe for the development in the Forest Service of a man of sufficiently distinctive training to be designated as a Protection Engineer.

Early in December Professor Boul, head of the Logging Engineering Department, took the senior class in Logging Engineering, onto the operations of the Gerlinger Logging Company near Corvallis, and made a final survey for one mile of main line logging railroad and a preliminary survey of another mile. This is practical work and is accepted by the Logging Company as a basis for their railroad construction.

PENNSYLVANIA STATE COLLEGE

FOR several years, owing to crowded conditions, The Pennsylvania State College has not admitted students from outside the State. The Fall of 1920 over 600 Freshmen were turned away, most of them being from Pennsylvania. This action, however, seemed to work an injustice to students applying for Forestry from states that do not have a four-year Forestry School. Inasmuch as the School of Agriculture at State College, of which the Forestry School is a part, is largely supported by Government funds, the Trustees of the College have recently decided that students applying for Forestry from States not having a four-year course in Forestry will be allowed to enter the College.

PURDUE UNIVERSITY

SEYMOUR MAZUR, who was graduated from the Department of Forestry at Purdue University, at Lafayette, Indiana, with the class of 1915, has recently become connected with the State Forestry Company, of Indianapolis, as a member of the firm. Mr. Mazur was recently discharged from the army, where he had a good record, and his new connection is a further recognition of his ability as a forester.

George Kunkel, of the class of 1918, has left the employ of the Forest Service to take up work with a private lumber company, as a timber cruiser at Eureka, California. Mr. Kunkel's work is chiefly in the redwood belt. He is very optimistic regarding the future in this field.

John S. Matthews, 1917, is now with a lumber company with headquarters at Scotia, California.

Mr. William Malcolm, M. S., Purdue, 1914, an early graduate of the department, has recently entered into a long term contract with the well-known school at Saint-Marys-of-the-Woods, to landscape and reforest their large grounds.

Plans are now being formed for the establishment of a summer camp for the Department of Forestry. It is likely that the camp will be held in connection with the Civil Engineering Camp on the upper end of the lower peninsula of Michigan. At this camp various problems of forest mensuration and organization will be worked out. The extreme proximity of the camp to actual woods operations, makes it a very desirable site. All sophomores will here receive first hand information on wood and camp life as well as supplement their lecture room experience with practical outdoor demonstrations.

NEW COURSES AT SYRACUSE

THE importance of dry kiln engineering in connection with forestry instruction is realized by the New York State College of Forestry at Syracuse, and a course in this subject is offered, to begin March 1. A recent graduate of the College of Forestry who specialized in dry kiln work has been given a job paying $7,200 a year in India on a three-year contract.

Another course to be offered for the same term at Syracuse is to give special training in timber grading. This is becoming of increasing importance with the high prices of lumber now existing, for the timber grader is able to save his employer large sums by a technical knowledge of various kinds and grades of lumber. The applications so far received for these courses come from men now engaged in the lumber industry, and their employers are paying the expenses of those who already registered for the two courses.

YALE FOREST SCHOOL

W. STUART MOIR, M. F., Yale 1917, who is at present in Sweden studying forestry as a Fellow of the American Scandinavian Foundation, reports that studies are being taken up at the State Forest School near Stockholm. Extensive trips are planned to the western and northern parts of the country to visit the leading saw-mills and pulp plants, and to study the technical management of the forests. Particular attention will be paid to the management of forests for pulp wood production and the securing of natural regeneration of cut-over lands, and a careful study will also be made of the particular application of the State regulation of the cut on private timberlands, together with the requirements for reproduction on these lands with a view to continuous forest production.

MAINE'S SPRUCE SUPPLY

"ONE third of the growing spruce of this country is on the soil of Maine today," said Senator Fernald, of Maine, in a recent address before the paint and varnish men of the country. "We have 22,750,000,000 feet of spruce growing here and we can cut 750,000,000 feet every year from now until the end of time and have just as much growing and we can with proper consideration furnish the cities of the United States with all the paper they need."

FORESTERS ATTENTION

AMERICAN FORESTRY will gladly print free of charge in this column advertisements of foresters, lumbermen and woodsmen, discharged or about to be discharged from military service, who want positions, or of persons having employment to offer such foresters, lumbermen or woodsmen.

POSITION wanted by technically trained Forester. Have had fourteen years experience along forestry lines, over five years on the National Forests in timber sale, silvicultural and administrative work; three years experience in city forestry, tree surgery and landscape work. Forester for the North Shore Park District of Chicago. City forestry and landscape work preferred, but will be glad to consider other lines. Can furnish the best of reference. Address Box 600, Care American Forestry Magazine, Washington, D. C. (1-3)

YOUNG MAN recently discharged from the U. S. Navy, wants employment with wholesale lumber manufacturer; college graduate; five year's experience in nursery business; can furnish best of references. Address Box 675, Care American Forestry Magazine, Washington, D. C. (1-3)

RECENTLY discharged from U. S. Army, young man wants position with a firm who has use for a lumber tallyman and inspector. Has a good education, 11 years' practical experience in lumber and can furnish good references. Address Box 880, care of American Forestry Magazine, Washington, D. C. (3-5-20)

WANTED—Working Assistant Forester for local Forestry Department in connection with forestry work in parks, nursery and landscape planting. Good opportunity for ambitious young man not afraid of work. State qualifications, salary expected and references. Address Box 890, care of American Forestry. (3-6-20)

ARBORICULTURIST is open to an engagement to take charge of, or as assistant in City Forestry work. Experience and training, ten years, covering the entire arboricultural field—from planting to expert tree surgery—including nursery practice, and supervision in the care and detailed management of city shade trees. For further information, address Box 700, care of American Forestry.

WANTED—Position as Forester and Land Agent. Technically trained forester, 33 years old. Practical experience along all lines included under the duties of the above positions. Former Captain, Field Artillery. Address Box 840, care American Forestry, Washington, D. C.

WANTED—Position with Lumber Company or Private Concern by technically trained Forester with five years practical experience. Box 820, care American Forestry.

A FORESTRY graduate with several years experience in forest work and at present employed along technical and administrative lines desires responsible position with private concern operating in and outside the United States. Address Box 870, care of American Forestry Magazine, Washington, D. C.

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PHILADELPHIA

SALE OF TIMBER, KLAMATH INDIAN RESERVATION CHILOQUIN UNIT

SEALED bids in duplicate, marked outside "Bid, Chiloquin Timber Unit" and addressed to Superintendent, Klamath Indian School, Klamath Agency, Oregon, will be received until twelve o'clock noon, Pacific Time, Thursday, April 15, 1920, for the purchase of timber on a tract, in townmanship 35 and 36 south, ranges 7 and 8 east of Willamette Meridian in Klamath Indian Reservation, lying south of the Sprague River. The said unit includes about 10,000 acres of unallotted land with an estimated stand of one hundred sixty million feet as to which contract will be made with the Superintendent and about three thousand acres of allotted lands with an estimated stand of forty million feet as to which separate approved contracts with the Indian owners may probably be made. More than ninety per cent. of the timber within the unit is western yellow pine and the remainder is sugar pine, incense cedar, and red and white fir. Each bid must state the price per thousand feet Scribner Decimal C. Log scale that will be paid for timber cut and scaled prior to April 1, 1924. Prices subsequent to that date are to be fixed by the Commissioner of Indian affairs by three year periods. No bid of less than three dollars and fifty cents ($3.50) per M. feet for yellow pine, sugar pine and incense cedar, and one dollar and fifty cents ($1.50) for other species during the period ending March 31, 1924 will be considered. Each bid must be accompanied by a certified check on a solvent national bank, payable to the Superintendent of the Klamath Indian School, in the amount of Twenty Thousand Dollars ($20,000.00). The deposit will be returned if the bid is rejected but retained as liquidated damages if the required contract and bond are not executed and presented for approval within sixty days from the acceptance of a bid. The right to reject any and all bids is reserved. Copies of the bid and contract forms and other information may be obtained from the superintendent, Indian School, Klamath Agency, Oregon.

Washington, D. C., January 21, 1920. CATO SELLS, Commissioner of Indian Affairs.

ALASKAN PULPWOOD FORESTS

THE pulpwood forests of Alaska, which are chiefly spruce and hemlock, would possibly produce under careful management a continuous yield of 2,000,000 cords per annum or about one-third of the present consumption of pulpwood and products manufactured from pulpwood in the United States, according to a recent circular of the Newsprint Service Bureau.

The National Forests of Alaska have a coast line of 12,000 miles and are estimated to contain 77,000,000,000 board feet of standing timber. Within the last ten years the Forest Service has sold 420,000,000 feet of timber in the Alaskan forests, from which have been produced lumber, box shooks, railroad ties, piling, etc., but no pulpwood. With its limited funds for timber surveys, the Forest Service has been handicapped in exploring the timber resources of the territory but has exerted every effort to develop the use of these resources. Various tentative applications for developing pulpwood enterprises in Alaska have been since 1910 but these have been for the most part dropped because the applicants found they could not finance the enterprises. The pulpwood offered has been priced at low rates, conforming to the general sale of stumpage prices in Alaska, representing the very low timber values obtaining in an inaccessible and undeveloped region. The Service has felt it necessary in the public interest to provide in its contracts for a reconsideration of these stumpage values at intervals of five years, beginning when actual cutting operations commence, with an opportunity to increase the stumpage prices if an expert appraisal showed the pulpwood to have actually a higher current value.

The sale terms offered by the Forest Service have not delayed the development of this industry but the obstacles have been the enormous transportation difficulties, involving prohibitory freight rates, the lack of labor and of towns, wharves and all supply facilities, and the very large investment required for installation of paper and pulp plants.

REPLANTING INVESTIGATION

THE NATIONAL RESEARCH COUNCIL has received a gift from the Southern Pine Association of $10,000 to pay for the incidental expenses of a co-ordinated scientific study by a number of investigators of the re-growth of trees on cut-over forest lands with the aim of determining the best forestry methods for obtaining the highest productivity. Although some of these cut-over lands can perhaps be most advantageously used for agricultural purposes there is a large acreage of them which will yield better returns if devoted to reforestation.

Despite the large amount of forest study that is being conducted under Government and State auspices, there is much need for additional investigation. This is well recognized by lumber men and is especially indicated by the action of the recent meeting of the Southern Forestry Congress at New Orleans in formally endorsing the scientific projects of the National Research Council in regard to forestry. The gift from the Southern Pine Association is made as a result of this action. The investigation will be conducted under the advice of the Research Council's special committee on forestry and will not duplicate any present government or other undertakings along similar lines.

PULPWOOD IN QUEBEC

THAT the Province of Quebec has more than one-half of the entire pulpwood supply of Canada and the largest unit of forest wealth in the world is the claim of the Prime Minister of the Province, according to the United States Consul General at Ottawa. The Prime Minister further stated in the address quoted, made to the members of the Canadian Pulp and Paper Association, that there had now been cut about 1,000,000,000 feet of timber, and he was informed that, with proper management, there might be cut four or five times more than that without endangering the future supply. He emphasized the importance of keeping the raw material for the use of the Canadian pulp and paper plants, and indicated that this policy would not be relaxed, suggesting that the Provincial Government might act further and that the time might come when they would have to limit the cut of the Quebec forests for the exclusive use of Quebec mills. Quebec has been an important source of supply to the paper mills of the United States.

TO REFOREST BURNED AREAS

EIGHT million trees are sprouted at the Savanac nursery, Washington, every year to reforest the burned areas in the United States forest district No. 1, which takes in parts of Montana, Idaho and Washington, according to L. A. Fairchild, government tree-planter. "There are two tree-planting seasons in the year," said Mr. Fairchild. "The first begins April 1 and lasts until June 15 and the fall season is from September 15 to November 1. There are four tree-planting camps in this district and two crews of 16 men in each camp. A good camp with favorable conditions will plant 1,000,000 trees during the three months of work and an expert planter will put in 800 trees every day. "The majority of the burned areas will reforest themselves. We are concerned with the other sections. Crews are sent out early in the year to map out these sections which show no signs of self-reforesting." Mr. Fairchild said that the Savanac nursery at Haugan, Montana, is the largest in the United States and that D. C. Olson, superintendent, is one of the best known tree experts in the country.